A Calendar of Doubts and Faiths

WILLIAM MARIAS MALISOFF

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A CALENDAR OF DOUBTS AND FAITHS

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WILLIAM MARIAS MALISOFF

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To

SALLY JUSTER MALISOFF

FOREWORD

"THERE IS NO DOUBT IN THIS BOOK," says the KORAN. "Here is doubt upon doubt," says the "Calendar." A normal expectation, be it logical or not, is that men will seek uncertainties in the former and dogma in the latter. With an eye to fate, the author should perhaps have anticipated this by calling his volume simply a "calendar of faiths."

The truth is that doubt and faith are correlatives, and not contradictories. Doubt is no more conceivable without faith than good without bad, up without down, here without there, or before without after. The problem is not to oppose optimism and pessimism, but to find how they live side by side in the same human breast.

Even a budget of doubts may have a thesis. The author's is this: Doubt is the constructive element in the evolution of faith. It is a necessity, an ingredient of our daily bread. Its oscillations between hopes and fears determine the goals of the mind. It is crea-

tive and recreative in its insatiable, never-ending criticism, and constant confronting of the old with the new.

Indeed a strong faith dominates the author. It is that doubt is the universal mother of philosophy, science, art, true religion, progress, life. This has enabled him to reach the December of his calendar. It may help the reader to traverse a crowded year of doubt—and faith.

W. M. M.

THIS SHIFTING WORLD

THIS SHIFTING WORLD

"But it does move"—GALILEO GALILEI.

IF ADAM DOUBTED THE GARDEN OF EDEN, his progeny may well doubt the shifting world. It is a place not easy to live in and hard to understand. The descriptions of the world are legion, and there is, in a fashion, a new one born every minute. I should like to submit, meekly, a few of the outstanding pictures, and still more meekly, one of my own. My own, perhaps, may be found between the lines.

Prehistoric accounts of the world are not lacking. By this I do not mean to refer to the interesting drawings of early bisons and mammoths in the caves of FRANCE and SPAIN, or to the EGYPTIAN Book of the Dead, or to CHALDAIC beginnings of writing. I should rather refer to our own bodies in all their resplendent familiarity. They are very ancient records indeed. In substantially their present form they have existed, let us say, 1,000,000 years. I shall not, however, join

issue on that with anyone who might disagree, and should not hesitate to drop even as much as 500,000 years from the estimate. It will not change my contention. The human body is marvelously ancient. Furthermore, if evolution and its mainstay, animal descent, are true, the highly complex human body has evolved from lower forms. The lower forms have surely been about for at least 100,000,000 years. Man, tiger, bird, lizard, mollusk and amoeba have existed through vast periods of time in the bosom of rocks and water still more astonishingly ancient. I should not say "existed" but rather "lived" or "interacted," for I must not mask the richness and subtlety of the events. The results are eyes that see, ears that hear, noses that smell, tongues that taste, nerves that tingle, and above all brains that are conscious, self-conscious, and think. Should we really learn to read these records we should be reading the meaning of "world."

In the sense pointed out here we have always more or less "understood" the world. The salamander shares this understanding with us when he grows a new leg. Indeed he surpasses us. As a tad-

pole he is even more brilliant. Should he lose the lens of his eye and find himself without similar tissue to replace it, he will replace it just the same with a new lens from entirely foreign tissue. Moreover, he does it all with an enviable smoothness and simplicity found elsewhere only in genius. Our own physical development from a speck of a cell, through a multitude of curious complications, into safe and sane organisms, is saturated with truth and an inner intelligence that I feel may help us to solve or dissolve all the problems of "world." If we could but somehow throw the snares of language and intellect about it, I am sure all would be well with the world!

As things stand at present, however, I fear the goal of deciphering the world from the subtle clues furnished by our own evolved beings is most distant. The 100,000,000 years of our past will perhaps be but the first minute of an endless life of discovery. At that it is but a modest request from eternity. I know, too, of some temperaments who would prefer such a prolonged quest to any dazzling array of miracles. I should find a fellow-researcher in GOTTHOLD EPHRAIM LESSING who soliloquized

about the matter to the effect that, if the Almighty offered him Truth in one hand and the Everlasting Search for Truth in the other, he would waive the first and would plead for the second, in spite of its endlessness! There is a noble courage in this stand, which, I suspect, nevertheless was born of desperation. Our problem may be endless.

Since a clean straight line is not the shortest distance to the real, there is no choice but to detour. The side excursions of exploration that mankind has repeatedly embarked upon have not been without their rewards. Because we must toil for our knowledge in the sweat of our brow as bitterly as for our daily bread, its acquisition, humble as it may be, is as dear. I have waded through quite a few arrogant, cock-sure, apocalyptic descriptions of existence that carried no conviction at all, because they carried no sincere struggle. On the other hand every honest effort, steeped in honest doubt, and perhaps full of honest error, has compelled attention and a recognition of its relative truth. It would be worth while, then, to cast a sympathetic glance on notions which have previously been true to countless crea-

tures, flesh of our flesh and bone of our bone,—myriads of savages, fighters, toilers, and, in their way, thinkers.

Primitive man knew the world in a way we cannot ignore. To dismiss him as a bundle of irrationality is easy and irrational in itself. Surely he has not the predilection and the formal skill of some few of us for reasoning, lacks the power to analyze a situation, and is not a bit scientific; but just as surely he has a large natural talent and shows capability in many ways. He gets about and adapts himself marvelously well. He has made our fundamental inventions. He has seen things whole and he has seen them true, but not with our academically approved mental preconceptions. We must interpret patiently the attitude of a native of the French Congo accused of a murder of which he was innocent, when he said: "I will pay, because as a matter of fact I might have killed him when I was asleep; but I have no conscious knowledge of it." The dream is real. Omens are real. The visible world and the other are one. LIVINGSTON likewise understood the South African when he perceived that "he actually

dwells with invisible spirits and intangible forces. To him it is these that are real and actual." To some of us, electrons, atoms, gravitation, evolution, a complex, libido, the social consciousness, are quite as real, though they too are invisible spirits and intangible forces. I do not know where to draw the line between the real and the unreal. I do think I know enough to fear to start drawing lines altogether, and I feel that there may be no shallow lesson in the primitive's seeming naivete in the matter. It will serve excellently to reveal our own naivete. The fact that a savage, for instance, does not admit of the idea of accidents and sees in everything a direct, mystic cause, leads me, as well, to consider why we constantly refer to such things as "accidents" and, also to a very natural hunch that after all there may be a direct cause, mystically flavored with revelation, for all that goes on. Are there really true accidents? Has not an accident a cause? After all is said, how can we be sure that we are not dreaming of both cause and accident, the real and the unreal? When two CHIRIGUANOS of SOUTH AMERICA meet they exchange the following greeting, "Are you alive?" "Yes, I am

alive." What beautiful, super-scientific caution! Who knows but that in the year 2929 the same salutation may not be in vogue among the SUPER-HUMANOS OF ANTARCTICA!

If our early ancestors have not transmitted the mystic gift very successfully, they have done quite well in constructing a very practical external world at that. We are not as adept as they in recognizing our neighbors by their footprints. Compared to them we are insignificant hunters. We can not even read facial masks anywhere as well as they seem to have done. What with ghosts, spirits, omens, they were as materialistic as any business man who looks upon the world as a dish set before his royal self. Their judgment of values has been individual and concrete. I do not think any significant amount of abstraction has been found in the primitive; certainly no spirituality of the abstract kind that marks our highly developed types and is likewise so disappointingly absent in our prosaic majorities. Were they the carriers of an important all-too-human truth in that respect also?

The matter-of-fact is the rule in early cosmogonies.

The "mystic" savage was no EINSTEINIAN, no deist, nor a believer in genuine miracles. Creation out of nothing—an idea which some of us consider as simple—did not convey a glimmer of sense to him. Does it to us, outside of the mere words? He always found it necessary to start with something ready made. Do we get along any better? Small wonder, then, if he assumed the preexistence of world-matter in a heaven or somewhere. There was no abstract, inconceivable god to rule over this heaven. Something more tolerably human, a demiurge, was preferred, or, better still, preternatural animals. When H. G. WELLS demands a god who is modestly enough only a great *king* (British influence?) he too frowns upon a god who is so abstract that he cannot have anything commensurate with us, who is just sheer mystery and cannot sympathize or even chastise. Thus, as naturally as MR. WELLS, the NORTH AMERICAN INDIAN conceived the creation of the world by a crow, who stole the sun, moon and stars out of a box; or the Great Hare "MICHABO" who did quite as efficiently. The POLYNESIAN is well within his rights when he looks upon the sun as an egg

deposited by one of these convenient birds. The islands? Why, TANGALOA, the sea-god, broke up some eggs. Hence the islands. The PHOENICIANS, the GREEKS, and even the HINDUS, at one time were also quite content with the notion of a world egg. And if not an egg, then let it be a seed,—thus reasoned EGYPT. To the unspoiled primitive the story of the world was the story of matter, choice, solid matter, rich in the potentialities of seed and egg, self-endowed with all the possibilities of development that even a score of HAECKELS might demand.

It is only when the primitive becomes an ancient that he permits himself to become enmeshed in a tangle of doubts and abstractions. An "advanced" POLYNESIAN did by a stroke of genius find the origin of things in PO, darkness. Good, but no longer substantial. The EGYPTIANS, too, got to talking about Nû or Nûn, a dark flood wherein the germs of all things slept for ages. The IRANIANS, on the other hand, found a kind of dualism more satisfactory. They started matters with a good, omniscient spirit that dwelt in endless light, and an evil, limited spirit that dwelt in endless darkness. A still more advanced INDIAN

(HINDU) version reads: "The self-existent Lord, who, with a thought, created the waters and deposited in them a seed which became a golden egg, in which egg he himself is born as BRAHMA, the progenitor of the worlds." Thought is now the creator, but he still operates through seeds and eggs. BABYLON and ISRAEL built on no surer foundations. The BIBLE, indeed, introduces abstractions into these conceptions in a coherent system, yet it does not go as far beyond logic as the most advanced of all, the RIG VEDA (INDIA) which speaks of the beginning: "There then was neither Aught nor Naught." PLOTINUS, HEGEL, the relativity theory, could not be more baffling and worthy of the name of divine than "neither Aught nor Naught."

Such, then, is the perspective of our predecessors. Even they have traveled in their way the entire course from the simplest of world stories to a riot of inconceivables. They have bequeathed on us a palpitating, living world of the senses, and an ever-growing, ghost world of speculation. Rather, these are not single worlds, but *types* of worlds. They are all human worlds. They are all necessary to the

human spirit. They are all real, as real as we can make them or feel them. I intend to consider quite a few of them in this Calendar, the worlds of self, of society, of the will, of the intellect, of emotion, of the disciplines of science, art, religion, philosophy, of madness, perhaps; but in this chapter I would merely stress what is now popularly referred to as "The nature of the external world" or sometimes as the "physical world" or plainly, "the material world."

I do not wish to dwell unduly on the worlds of the Ancients, were they GREEKS or ISRAELITES, but I am fond of their bland calling a spade a spade. In the Biblical account, after a very brief metaphysical skirmish, we are in the midst of practical, almost experimental, science. Right at the outset God is alleged to divide the land from the waters of an original chaos. From the land and the waters he proceeds to make further divisions. Evolution? Living creatures are divided. The luminaries are divided. Man is split off and is given the function of dividing up the world. He is told to multiply. He does it by division. He divides between good and evil, knowl-

edge and ignorance, mortality and immortality, even at the cost of the loss of heaven. He is dust, and yet more than that, he is of the earth and his concern is the earth. The dust, however, is animated by spirit. The drama that follows, is, I say, a typical drama of science,—the conquest of an objective, resistant world, puzzlingly external, yet strangely familiar, by a spiritual being bitterly bound to this very earth in his origins and behavior, but following a higher law as if from another realm. A standard man of science, I should remind the reader, also prefers to leave metaphysical certainties in a Paradise from which he believes man has been rather permanently banished, and is quite ready to tackle the world as a most hostile, deceiving, baffling conspiracy of unwilling matter, and yet considers himself as the coming master by virtue of the higher powers within him that make him a scientist. The Biblical world was pie for the scientist who should have rescued the carving knife from the hands of the theologian!

The explorations of the outer world that followed were punctuated by strokes of genius. I should insist on that because the tendency has been to look upon

outlived theories as mere childishness. The idea that there are only four elements, earth, fire, water and air, looks pitiful when compared to the highly polished and firmly established present-day chemical theory of 92 elements, yet it is not seriously different in a philosophic sense and still finds some use in the distinctions between solids, liquids and gases. The very old point of view that endeavored to present all existence in terms of one element, rather than of the four, is still with us, since we are endeavoring to reduce the 92 elements to one simple basis of structure in terms of the simplest combination of positive and negative electricity found in hydrogen, a proto-element. Similarly the notion that the earth was the center of the solar system led to pretty accurate astronomical predictions and would have fallen sooner if it were not for its actual usefulness. The same applies for every subsequent theory. There was nothing more regrettable about the older speculations at their worst than the necessary experience of a child in burning its hand with fire or in learning how to walk. I look upon the present world as still

in an adolescent stage. It is the adolescent who is particularly contemptuous of childhood.

Flatland, then, was probably an adequate world, —and, thus, a true one,—for the Middle Ages. There was so much to be attended to in merely scratching the surface for mental as well as physical sustenance, that no one seriously worried about its curvature, although some learned GREEKS knew very well that it was spherical or almost spherical. Nor was it egotism or blind adherence to the word of the BIBLE that chose the earth as the center of the solar system. It was the fact that no one felt it move, except in the rare and erratic motions of an earthquake. Besides, it is obvious to students of science that alchemy had to have its day before chemistry, astrology before astronomy, blood letting and herb treatment before medicine, hit-and-miss before painstaking system. The practical arts were laying the foundations of fact for the sporting grounds of theory. Mute theorists abounded too. There were many in the obscurer centuries that had the boldness but not the immediate success of COLUMBUS, and did something or other which we can see now

prepared the world for proud discoveries. Look closer and there is a geology of intellect that shows how one stratum can follow only upon another without gaps.

It is a mistake, too, to imagine that in so recent a period, things were left unexplained. They simply demanded less of an explanation for fear, possibly, of confusion. In the general squalor and misery of the times, when life could be barely sustained and plagues and wars left but little to sustain, when it was very risky to visit a neighbor or to receive a visit from him, it is hardly to be wondered that people entertained as an ideal, the very opposite of this immediate experience, a world spick and span, safe and untroubled, free from doubt and from sin. Unsolved problems, so to speak, were particularly disorderly sins, and to sin against the sole relief in an ideal world in those days was to run the most dreadful risk of hell fire. Earthly fire was on hand also to administer to heretical disturbers of established truth, and, hence, of the dearly bought bit of peace that made life tolerable for the exploited and bewildered millions. When GALILEI proved that the earth moved,

he thereby moved it and its inhabitants in the direction of a hell more hopeless because unavoidable. Granted the instinctive as well as the theological bias of the day, it was a true impulse that labeled him a dangerous destroyer. We of today ought to be fair enough to realize this. We need but think of the peculiar unhappiness of millions of intelligent yet quite helpless people since that day, who were lost all the more hopelessly because they found themselves in a world that could *not* be lost. To develop the courage necessary to face such a calamity to an ideal, to be able to face an improvement in truth at any cost, requires the ferment of centuries. Collectively we have not found that courage yet.

A charge against Flatland has been that it made man the center of the universe, the all-important consideration of the divine powers. That the accusation has not been answered many times is surprising in the extreme. The earth may be round, cubic, oblong, four-dimensional, any shape you please, a mammoth, a fly-speck, and man may yet remain the most colossal egotist. I do not see what logic demands that any increase in the scale of the

universe should make man feel more diminutive. On the contrary, he may become—as on the whole he has become—more inflated than ever with a sense of his unique importance, since he is apparently the only one who has learned the astonishing facts about this expanding universe. He expands with it. His conceit now is of the intellectual stamp which may offend a hundredfold more than that of a child. Especially among men of science, who have engineered some of the advances, a modesty as to man's position in the universe is affected, but somehow fails to convince. Why not express an honest satisfaction and even an honest pride? At that I am not so certain that man's tacit or active assumption of self-importance is a disgraceful thing. It may be a prime biological and psychological necessity of his progress and of his success in the struggle for survival. I am reminded of GOETHE's optimistic slogan to the effect that in order to succeed one need but spit on one's hands and go to it. In world terms it would be only necessary to say: "I am the only one that can discover the universe for myself. I shall be

happier in believing that I can do it. I am doing it." And it will be done.

Our quarrel with the preceding age is hardly along scientific lines. They attended to their science as well as they could at their stage of development. They suffered unduly, however, through the carrying charges of a spiritual realm that had a very defective economic and political background. Naturally it attempted to meddle with the speculations of science and philosophy as well. So discordant were these elements that neither CAESAR got what was due unto CAESAR, nor did the spiritual get its own. The art of hypocrisy spent itself in relative crudities like the Inquisition which claimed that it never put a single person to death. It merely passed judgment and delivered the offender to the secular arm. We are far ahead and know well how to render innocuous any spiritual world, whether it be a chimera or the actual promise of a golden dawn. We render what is due CAESAR unto CAESAR, and then pause, since there is hardly anything left to render. The inner world is well hid and exacts no external tribute.

Yet another strange fashion is to blame the contemporary astronomy for the narrowness of the spiritual world of the so-called Middle Ages. To believe many accounts, given in all innocence I suppose, all COPERNICUS or GALILEI had to do was to prove that the earth moved about the sun, and the mirages of dogma would fade away. Alas, if such were the effects and power of reason no such dogmas would have arisen in the first place. The economic causes were the more potent, and at that time they depended directly not at all and indirectly in a slight manner on the state of astronomical theory. Nor do people at large pay any attention to proofs of a scientific nature. Nor do they mind contradictions in their theology. They welcome them. They repeat, "Credo quia absurdum est," "I believe because it is absurd." This seems to hold whether there is a law of gravitation or not. Astronomy may lead, but who follows?

I believe that we do follow the advances of science, but not too willingly. We follow as economic beings who are enmeshed in the chains that inventions have put upon us. It is the practical inventions that follow

the theoretical triumphs. The contact is direct only for those who are philosophically minded. I am reviewing the changing conceptions of the physical world not for the sake of drawing artificial distinctions between various ages but because I see in them a program of human advance that may last for many centuries.

Is there any catch in this term "physical world"? There is none intended. It is meant to comprise all sorts of notions concerning matter, its ever-present companion, energy; its ever-present setting, time and space; and its ever-present flux ruled by cause and effect.

I have mentioned a few cosmogonies. I would supplement them with a few astronomies that have shifted the world. We will assume that the CHALDEANS have already observed the stars, named them, and noted some that did not keep their places, in other words, the planets. Besides there were some that came only occasionally, ostensibly the comets. Now and then the two giants of the sky would come close. The moon would obscure the sun. An eclipse. GREEK speculation followed and culminated

in the beautiful theory of PTOLEMY. The paths of the planets are circles. The circle is a *perfect* figure and it is a section of a *perfect* sphere. In a poetical vein one might well say that each planet is attached to a crystal sphere, and perhaps those of keen hearing may hear the music of the spheres. The earth is at the center of these spheres. It is itself a solid globe. Yet, there is such a thing as the retrograde motion of the outer planets. These were supposed attached to secondary spheres rotating about points on the primary spheres. The primary spheres at the same time rotated about the earth. The resulting curves formed a system of cycles and epicycles. The ingenuity of PTOLEMY was astonishing and held the respect of the educated world for almost two millennia. In fact I do not think we are entirely finished with the notion yet. It may come back in a transformed and corrected guise. Those who have followed the growth of scientific theory closely know that such comebacks are the *rule*. Again, I am tempted to repeat, the religious notions of the day have very little concern for the matter. The genius who conceives an explanation is much more abjectly

dependent on dry, reluctant facts. The system of cycles and epicycles fitted the facts with astonishing precision.

A revolution in astronomy came as a result of TYCHO BRAHE's check up on PTOLEMY, and establishing that there was a shift of eight minutes of arc for MARS not at all accountable by the system of cycles and epicycles. Said KEPLER: "Out of these eight minutes we will construct a new theory that will explain the motions of all the planets." It was a true prediction. In due time came the new laws of motion of KEPLER and NEWTON, which not only charted the heavens with astonishing accuracy but also made possible enormous strides in the development of the physics of bodies on the earth. The work of COPERNICUS and GALILEI as well as BRAHE's accuracy, were, of course, necessary steps to the synthetic triumph of KEPLER and NEWTON. If we consider that before GALILEI it was actually believed that heavier bodies fall more quickly than light bodies, we realize what handicaps had to be overcome to clear the ground for advance. Fortunately, there was a leaning tower at PISA that served to demonstrate the equality of the

accelerations of light and heavy bodies. This information was needed by NEWTON. Similarly KEPLER would have been rather helpless without the original bold suggestions of COPERNICUS (1543) who definitely established the basic theoretical lines for the new world, the sun stationary and at the center, the earth and the other planets moving in circles around it, the sphere of the stars stationary and the earth rotating instead on an axis. Here was a clear realization of the relativity of motion. We may be moving past an object and may imagine that the object is moving past us. It all depends on the point of view. With such a theoretical foundation and TYCHO BRAHE's data, it is not surprising that KEPLER in due time corrects the motions of the planets and the earth to ellipses instead of circles. An ellipse has two foci instead of the single center of a circle. The sun is at the one common focus of the ellipses that the planets describe. He is lucky, too, that the GREEKS had so thoroughly studied conic sections, one of which is the ellipse. The heavenly bodies travel in conic sections, or ellipses, parabolas and hyperbolas.

A great deal that followed is referred to as "gravitational astronomy." It was inspired by and rolled up an avalanche of proof for NEWTON's law of gravitation.* An imposing array of mathematicians, among whom were EULER, CLAIRAULT, D'ALEMBERT, LAGRANGE, LAPLACE, LEGENDRE, GAUSS, POISSON, CAUCHY, ironed out every wrinkle in the new map of the world. The planets tug at each other and thus cause "perturbations" or deviations from the true course required by the law. The perturbations were made or shown to conform to the law. From my inspection of the matter I judge that they were *made to conform*, not, of course, out of sheer arbitrariness but because otherwise very odd and far-fetched schemes would be required to explain them. An army of demons could have been conjured up, dis-

* Newton's law states that any particle in the universe attracts any other particle with a force directly proportional to their masses and inversely as the square of the distance between them. The origin of the force remains inexplicable and its propagation a complete mystery as far as this statement is concerned. It is possible, however, to state the law in the form of a differential equation referring to acceleration and sidestepping the question of a force. *The mystery is merely shifted.* For what then is the origin of the acceleration? I have stated several laws recently sidestepping acceleration, but I've had to make certain assumptions about vortices. I am brought to the same wall by the question, What is the origin of the vortex?

tributed in space, decorated with appropriate names, and given the task of accounting for every kind of straying from the path of a virtuous planet. The upkeep of such an army, however, would ruin any intellect that would try to maintain it. No one could conceive any more *economical* formula than the gravitational, hence it stood as the "true" law.

A triumph that had a crushing effect and gave an air of finality to the labors of the mathematicians was the successful use of the calculations of perturbation for the discovery of the last of the major planets, NEPTUNE. The heroes were LEVERRIER and ADAMS. SATURN wasn't quite steady on his pins and seemed to reel or be jostled off his course occasionally. The perturbations indicated a neighbor. He was calculated into existence in certain parts of the heavens at certain times. Telescopes were trained at the exact spots and NEPTUNE loomed into view! Simple, efficient, true! NEWTON had spoken the basic truth, all else was commentary.

Fate is irony. The same LEVERRIER planted the seed of destruction for the very truth that he seemed to prove eternal. He established that the orbit of the

planet MERCURY was rotating on its own plane at the rate of forty-three seconds of arc *per century*. Compared to the eight minutes of arc that made KEPLER glow, this was like quibbling over trifles. Nevertheless it proved to be of greater significance. It brought several generations of scientists to their wits' end to try to explain this anomaly for MERCURY. No neighboring planet as in the case of SATURN, no odd effect from the sun, no peculiarity along its orbit, could be made to fit the fact. And so it stood a mystery till it was found to fit with weird accuracy the requirements of EINSTEIN's relativity theory. His equations called for an effect of 42.9 seconds for MERCURY and scarcely measurable effects for the other planets. No mere coincidence. But, is it finality again? Burnt twice, we are now fire-wary. First eight minutes of arc, then forty-three seconds of arc in a century, what next? Still smaller effects are being sought, and justly so, even though the dread theory seems to thwart all hopes. The highly intuitive POINCARÉ anticipated EINSTEIN, when he said: "MICHELSON has shown us that physical procedures are powerless to put in evidence absolute motion; I am persuaded

that the same will be true of the astronomic procedures, however far precision be carried." The precision will be carried farther and farther, nevertheless.

Here I must interject a few remarks concerning the savior, relativity, just enough to avoid trying to explain it non-technically, which, I think, is a clumsy undertaking at its best, and just sufficient to carry on the astronomical story and to introduce that of the atoms.

On its physical side, relativity represents a bias or an assumption. It is a belief that it *must be impossible with physical means to determine absolute motion by any experiment whatsoever.* This can be restated that the phenomena of nature will be the *same* to *all observers* who move with any uniform velocity whatever relative to one another. A clever summary puts it that there are as many ways of measuring time as there are observers, and *all are right.* Each observer will prove his clock right by the most unimpeachable reasoning, and, unless he is a relativist, will have more damaging things to say about other people's timepieces than even MARK

TWAIN. The most cunning experiments devised to discover "absolute" motion, as, for example, uniform motion with regard to the ether (the seat of electric forces) or some change in the speed of light with direction (MICHELSON), have always led to a complete cancellation. Whatever makes a difference to the thing measured seems to make precisely the same difference in the required proportion in the instrument or medium used in making the measurement. The object and the instrument and the medium are in a conspiracy of silence about the absolute.

This gigantic plot on the part of nature to yield only *relations*, is made very formidable by unusual mathematics. It takes into the physical realm a geometry of space we are unaccustomed to, and creates a four-dimensional world. In this mathematical world which claims to be the truest mirror of the physical, the three dimensions of space and the one of time are on a very intimate footing, and are almost equivalent except that a minus sign in the right place enables time to point forward in the peculiar way it does for us. Outstanding, also, is the

peculiar twist given to the idea of force. Force or its perception is merely the result of the "curvature" of the observer's track through the four dimensional world. The term "curvature" is very technical. It is remotely related to what we see when we note a train turning a corner. There is no layman's term for what the equations really convey. Even the high potentates of physics misuse it when they subside into ordinary speech. That is why they permit themselves to say that the universe is curved, closed, finite, and has a radius. These words must be immediately contradicted by the speaker himself because habits of honesty make him perceive that he is guilty of misbranding. He buffers his words with many corrections and provisos. Not so, however, the man who repeats him. Note this from an editorial: "The radius of the universe in miles is 325 followed by seventeen ciphers, as contrasted with the earth's radius of but 3,963." This is precisely the wrong contrast. It is not that kind of radius. It is merely a statement that a *physical* ray of light would travel such and such distance to come back to where it started. The term "come back" is itself not above suspicion. How the

paradox flowers may be gathered from EDDINGTON's delicious summary of the evolution of ideas concerning the motion of the earth:

(1) It is trying to go in a straight line but it is roughly pulled away by a tug emanating from the sun.

(2) It is taking the longest possible route through the curved space-time round the sun.

(3) It is accommodating its track so as to avoid causing any illegal curvature in the empty space around it.

(4) The earth goes anywhere it likes.

He thus humorously substantiates HEGEL: "The stars are not pulled this way and that by mechanical forces. They go on their way, as the Ancients said, like the blessed gods." If the fourth step is legitimate, I am sure a fifth follows. It is that we might just as well say the *earth stands still*, if it suits our, not its, convenience! GALILEI's obstinacy might have been tempered by higher mathematics. Likewise, I believe, the term "center" may be made to vanish. I should therefore tolerate the statement that the earth is the *center* of the universe, if it suited our conven-

ience! Anything short of complete annihilation—perhaps even that?—if it suits our convenience!

Wily PASCAL sniffed the difficulty in describing the old-fashioned space as an infinite sphere, the center of which is everywhere, and the circumference nowhere. The meticulous POINCARÉ permitted himself to remark, "this affirmation the earth turns round, has no meaning." He meant it had only convenience. What end do we serve, when we say in the most modern way that events are intersections in a four-dimensional continuum of world lines or "geodesics"? A new convenience.

With all the strictures I have made I myself must return to some tolerable compromise with ordinary language. How else can I continue with astronomical "facts" in the humble terms in which they first appear to us? Although I am rather impressed that at the speed of light, mass becomes infinite, all lengths are zero, all clocks stop, and similar marvels of theory, I must start with a plain statement that ROEMER discovered the speed of light to be about 186,000 miles per second and thus showed it to be finite. Similar plain facts are the remarkable steps

taken by FRAUNHOFER and KIRCHHOF in founding a chemistry of the stars by the analysis of their light. The point of the matter is that, at the risk of some inaccuracy, one does speak now quite definitely of the distances of the stars, their speeds, sizes, masses, temperatures and other special conditions. These things do mean something to us and do serve our convenience. In this sense, the solar system is very well known, although one still puzzles why some satellites rotate in a direction opposite to others, whether MARS is inhabited, or how fast the clouded planet VENUS is rotating on its axis.

Look upon the stars. Including the sun their range of brightness is 100,000,000 to 1. Aren't we ignoring the dimmer ones? There are giants and there are dwarfs among them. BETELGEUSE is at least 100 times the diameter of the sun. The nearest star, PROXIMA CENTAURI, is a red dwarf. The quality of the light is fraught with great significance. It gives clues as to distance, speed, age. The masses of the stars? From fifty times that of the sun down to one-eighth that of the sun, and usually in the range within half to twice the sun. Why such uniformity? One stumbles

upon vast clouds in space. In these clouds the element calcium predominates. Strange. Again, there are stars that vary in size as you look at them. They pulsate in a periodic manner. New stars flare up occasionally, novae. Dim nebulae in which stars are differentiating out in vast numbers, some moving at speeds as high as 3,000 miles per second! Or is it we who are moving at that speed with respect to them?

What is the geography of the stars? At least two drifts of the stars as a whole have been identified. We find ourselves to be members of a limited system or "galaxy." Our own little congregation, according to the latest, includes 100 or more globular clusters of stars. It is quite a crowd since each cluster can probably boast of millions of stars with or without companions. It has a center, now technically referred to as the "center of the universe," estimated to lie somewhere toward SAGITTARIUS, 50,000 light years away,* that is a mere three billion times the distance of the earth from the sun (the famous 93,000,000 miles). The galaxy of our private "universe" covers

* A light year is the distance traversed by a ray of light in 1 year, approximately 5,870,000,000,000 miles.

a spread of 200,000 light years. A gargantuan amusement of astronomers is to count galaxies or "island universes" presumably as respectable as our own. The COMA-VIRGO cloud of galaxies reveals about 300 members. But there are several thousands galaxies known. SHAPLEY, on his honor as an astronomer, does not hesitate to surmise that there may be hundreds of thousands of galaxies. Judging from his successes, if he lives long enough he may yet chart the range and map of the *galaxy of galaxies of galaxies*. Will that have a center too?

To those who want to know when TANGALOA broke up some eggs, there are a few answers. I have seen the figure 100,000,000,000,000,000 years as the age of some of the seniors of the heavens. What with its matter converting to energy (EINSTEIN) our own sun, which is no youngster, can last perhaps 100,000,000,000,000 years. Even this, however, may prove alarming, to seekers of immortality. They may find more hope in MILLIKAN's latest evidence of a *continued* process of creation of matter from energy in the universe to compensate a continuous degradation of matter into energy. He finds the clues in the space

filling cosmic rays that are much finer than even the rays of radium (gamma rays). They may be a by-product of the creation of a material atom from electric charges. Other scientists are rather cold to this idea. Nor, I am afraid, will the infinity seeker find much consolation in such physical cycling immortality, because it is sure to become dreadfully boring.

In the world of atoms reflection has been sought for ages of the world of stars. An overpowering "hunch" (or shall I say "intuition") led men to believe that the microcosm, or world of small things, is the mirror image of some sort of macrocosm, the world of large things. Several times the strict analogy between the two has been enthusiastically announced. A very recent one has been the portrayal of the atom as an astronomical system resembling the solar: in the center, a positively charged nucleus like the sun, and rotating about it, negative electric charges or electrons. A chorus was raised that now at last the dream of antiquity had come true. Yet, the similarity ended right there. No planet behaves like an electron. The speeds, characteristics and be-

havior in losing energy are different. The spacings are out of proportion, and worst of all there is no law of gravitation for the electrons and the protons (nuclei). Well, to make a very long story very short, the planetary idea of the atoms has gone the way of many beautiful theories as a theory, though it may still see a great deal of service in practice. The correspondence between the microcosm and macrocosm (other than relativity) has to wait for the discovery of a flyless ointment of theory.

Some such discovery is being claimed for the so-called "quantum theory." It discards the older notions of atoms, or the smallest particles of matter, picturing them as minute billiard balls, endowed perhaps with feelings of love and hate to explain their combinations and repulsions in the midst of a setting of random motions. It discards the pictures of the electric atom of great wide open spaces resembling the world of stars. The almost empty space called matter, it finds, baffles all attempts at formulating a mechanism of action. A peculiar mechanism —which is not a mechanism—of quantum "jumps" was first devised. The electron was conceived to jump

from one orbit to another, but it was forbidden to slow down, nor could it be permitted even to *exist* in the interval of the jump! Like the relativity theory this formulation is very easily wrecked on the rocks of vocabulary, and, when translated, persists in saying the wrong thing. As things stand now, after some thorough recastings, an electron is (1) a particle, (2) a wave, (3) a mathematical relation. EDDINGTON has suggested the compound word "Wavicle." The mathematics employed by the masters of ceremonies, HEISENBERG, SCHROEDINGER, DIRAC and others, is again a novelty to the older physicists. It is, on the whole, premature to predict what will emerge. HEISENBERG has stated a principle of indetermination that sets a limit to the accuracy of experiment. One may define, for instance, the *position* of an electron with greater and greater accuracy, but at the same time its *velocity* becomes hazier and hazier and indeterminate. If one improves the accuracy of the definition of *velocity*, the *position* becomes hazier and indeterminate. This cruel principle is a species of relativity with a vengeance, and sets a baffling limit to our knowledge of the external world

at our very point of contact with it. The philosophic implication is that *we cannot know completely that by which we are enabled to know anything at all,* namely the electron or the electro-magnetic wave of energy (light, heat, etc.). These are the minimum of interaction with our material bodies. With them we start and with them we might have to end.

In the ascension balloon of theory the desperate navigators are ready to drop any and all ballast,—the conservation principles of matter and energy, the famous laws of thermodynamics, and even the seemingly unescapable relation of cause and effect. I cite this as a bit of panic. Some already see the freedom of the will rescued from the prison of the ironclad world of the science of yesterday. I feel, however, that new chains are being forged. The old electron is dead. Long live the wavicle!

Should we, however, shut out the clamors of the populace of physicists and astronomers, we should be quite rudely awakened by phalanxes of other species of scientists and thinkers, and battalions of non-scientists. I shall give them an opportunity to say more later in this work. It is the biologists that

would cause the essential perturbations in our physical order. The chemists have submitted to the dominance of equations, but not they. They will count, of course, say the molecules of a liver cell, some 225,000 billion molecules of water, 53 billion molecules of protein, 166 billion molecules of fats, and 2,900 billion molecules of crystalloids, but all that with a different aim from that of the astronomers. They will insist that their problem is *life*, the birth, growth, functioning and reproduction of the liver cell, its evolution from other forms and its significance in an organism. The psychologists who cannot count on counting molecules, will pepper with shots of criticism any effort by biologists of a certain type to dissolve the criteria of life and mind. The philosopher finally will shake all foundations, till a mere human being might cry with despair. Thus BERGSON, voicing the extreme of a series of criticisms: "In short, the world on which the mathematician operates is a world which dies and is born anew at every instant like the world which DESCARTES thought of when he spoke of a continued creation." He would deny even pure mathematics! There is

always something else mixed with *mathematical and physical matter.*

Why not a living world of matter? Is matter just playing dead? I should like to close my list of doubts and faiths of the shifting material world with FECHNER's blithe speculation. The earth, whether it follows any equations or not, may be a living organism. It behaves like one. One cannot say it is not an organism because it has no lungs, liver, heart or brain. It does not *need* them in the forms we attribute to lesser living things from a narrow standpoint. The salamander grows a leg. The earth grows a tree and a salamander, and even a human being. These are *its* organs. Its movements require no legs, but it "goes where it pleases." There is no absolute reason, therefore, to assume it a dead, unspiritual thing because it is not animal in form. Likewise, the great mind of LEIBNITZ saw the same possibilities in the ultimate particles of matter, the monads. They may be fully spiritual, and, if anything lives at all, they live. *The analysis of matter will remain incomplete without the analysis of life.* Often I feel that we have gone the other extreme of naivete exhibited

by the CHIRIGUANOS. If we but had a mathematics of life-matter, of things in the making, what sport there would be in fashioning the realest of worlds!

Fantastic? The strangest thing of all to me is that one need not hold to just one world. The mind is big enough for all. I should want to maintain my worlds in amity, no matter if they diverge like the spokes of a wheel. At the center, or something which like other people I must call center, I should put my humble consciousness—what else can I do with it?—as a cross-section perhaps of a larger, social, all-human consciousness. This consciousness sets out on a conquest of its environment, itself included, by creating all sorts of worlds and checking up on them. In this endless prospect there is a host of physical worlds. We have but begun exploring them. They move and they do not move. They are prone to turn to something else. That something else is a creative element in ourselves and in the world, which is the same thing.

THIS SHIFTING SELF

THIS SHIFTING SELF

THERE ARE MANY selves in one self. There is one self in many selves. I shall dwell on the eternal search of the One in the Many and the Many in the One. I shall set my course on the difficult highway of Soul.

Those who wish to deny the soul or the self altogether, may speak first. It is possible to deny it. In words, at least. It is possible to say about a detail of the soul, as WATSON does, "Thought is highly integrated bodily activity and nothing more," and about the terms, will and consciousness, "I frankly do not know what they mean, nor do I believe that anyone else can use them consistently," and imagine that it has the full force of a denial. Really it is a substitution of words that may have a tremendous critical value, but it is nowhere as near nihilistic as it sets out to be. It is a statement that certain definite descriptions of the self in terms of will, consciousness,

thought, are confusing, and not as good as the author's pet physiological theories. It is a doubt in the rôle of a bully.

There are more moderate denials. They modify meanings or interpretations. They do not legislate old terms entirely out of existence, but operate by amendment. Such is the sophisticated notion that suggested that we had better say "it thinks in me" instead of "I think." It has been fruitful too. Brilliant, but not as destructive as it may seem to some, is WILLIAM JAMES's crusade. "For twenty years past," he said, "I have mistrusted 'consciousness' as an entity; for seven or eight years past I have suggested its non-existence to my students, and tried to give them its pragmatic equivalent in realities of experience." Nevertheless, he continues to use the word, now clarified and guarded against error, simply because he wants to be understood. It is not an entity, like a GREEK god, but it still represents a function rather well recognized by *conscious* individuals. Further, no serious detraction occurs, in my opinion, when someone points out that there are several ways of being conscious, as by perceiving, by remember-

ing, by thinking, and in a more complicated way, by believing; or when someone presses the point that we must be conscious *of* something, or, perhaps, denies it; or when someone points out an "unconscious" which can function when we are inattentive, asleep or in a trance. Discussion does not, as a rule, annihilate such a term. It changes its connotations, enriches them, makes them more tentative and yet more useful. We have not yet reached the state of clarity that would justify a total divorce from *soul, self, consciousness, ego, essence, life-principle,* and that queer word "entelechy." *

I plead for this tolerance of terms, since I do not intend to enter upon a hair-splitting analysis of attempts to annihilate discussion of ourselves. I should never completely finish, and, in the end, would probably fall prey to the temptation myself. I believe the frequency of attacks on the invisible enemy is proof enough of the belief in his existence. Behaviorism,

* Entelechy is a term used by authors so far apart as Aristotle and Driesch. Aristotle meant something equivalent to "spirit." Driesch means a kind of soul inherent in matter itself, and apparently not separable from it. Of course, no term will have the final say, not even symbols or pictorial schemes. The last explanation lies in being alive and somehow knowing it directly.

psychoanalysis, inflexible agnosticism, are highly civilized attempts to eat ourselves up alive,—a veritable orgy of self-consciousness and consciousness of self. It is cannibalism. In fact I believe there is more likelihood of understanding self by uncovering than by fierce tearing at our own entrails. The matter is delicately illusive for the experimenter as well as for the introspecting philosopher whose dilemma is stated by GOETHE:

"Cognize thyself," 'tis said. How does self-knowledge pay?
When I cognize myself, *I* must at once away.

I need but glance back to the primitive for the "natural" idea of the self. The glance is followed by careful, nay, anxious scrutiny, for the savage seems to have completed the cycle, which the sophisticated man wishes to, but can not. The savage seems to be unaware or almost unaware of a separate, self-conscious, thinking, feeling, selfishly human "self." He joins the young child in a baffling impersonality. He confuses us immediately by unstudied reference to himself in the third person. Although he does not say "it thinks in me" he treats himself rather as an

object than as a subject. At least he allows no sharp contradiction between the two, and no distinctions between himself and others. He has the power "to see oursels as ithers see us!" No wonder, then, if he admits animals, plants, objects, into a universal life, where they are all intimately interchangeable. It is remarkable what may appear to him (not falsely) on a par. A MUKONGO said, "There are four different kinds of men: white, black, ba-nganda (crocodiles) and PORTUGUESE," but he was apparently already under the baneful influence of civilization, or he would have included more. Quite lucidly to the point is the notion of the CARIBS of BRITISH GUIANA: KUANO, the king of vultures, behaves like a real king. APAKAUI, the smallest of the vultures, has to light a cigar for him. The point is driven still further. The animals are conceived to have even more power and cunning than human beings. Else, why do they keep so quiet? The personal histories some stones may have would prove interesting gossip, and bush bogies, free lance spirits as it were, would figure in many a weird tale. Call it "animism," if you will, but remember, we are far from being through with the savage's way.

The anthropologically instructed will recognize in the primitive the idea not exactly of a soul but of something soul-like, a great living principle in all nature, distributed with equal largess to all things both great and small, an idea described by the native words "mana" and "imunu" and the more showy European terms "Lebenskraft," "Seelenstoff," "Zielstof," "Potenz." If I interpret it correctly it is present in the ghost elephant as well as in the ponderous replica in flesh, in dream figures as well as in the shapes of broad daylight, in a bone as well as in the whole creature. To complete the lasting quality of this fine presence one must also try to see it in time, stretch it. Stretch it so that we recognize the psychologic truth in a native's remark about a battle fought ten generations ago, "*I* defeated the enemy there."

Similar oddities are to be expected with regard to "my" as with regard to "I." If I am merely my kind even for generations past, it follows, as it does in the MELANESIAN way of speaking, that I cannot speak of "*my* wife" or "*my* husband." It is not that companionate divorces have made the relationship

vague, as with us, but that with them the individual is not a separate, independent self. We talk of isolated egos. We delight in the conceit that we are born free and unequal. But, are we?

Perhaps a little child shall lead us to the genuine primitive selfless self. It seems to me that I can recall from personal experience the emotions that rule the savage heart. It is true that all things that moved possessed for me at one time a kind of essence of life. An arrow discharged from a toy bow seemed to pick its way with a will of its own. It exhibited all the caprice that EDDINGTON (who is not a savage) attributes to the four dimensional waltzing of the earth. When I heaved a brick at a contemplative pigeon who alarmed me by his philosophic, Sphinx-like motionlessness, the brick was the elastic messenger of a universal vibration that echoed in a racing heart. The stirring blaze of the sun and the fluid silver of the moon carried the message of "mana" to a wide-eyed soul. The cool forest—a vast forest of tall pine trees—whispered and murmured of that strange presence. The broad, steady river gurgled and splashed at the banks with the overtones of ex-

istence. Ah, can we not seize the truth of that once and for all? For we have lived it!

I feel, and my reasoning does not contradict the feeling, that philosophy and psychology at their best are but magnifications of the ideas of the savage and of the child. What else is brilliant JAMES' discovery which he puts: "In its widest possible sense, however, a man's self is the sum total of all that he *can* call his—not only his body and his psychic powers, but his clothes and his house, his wife and children, his ancestors and friends, his reputation and works, his lands and houses, yacht and bank account." We smile our approval. The matter has to be discovered to us. To the savage it is obvious. It is a priori. His personal pronouns extend beyond his body to objects. They include as intimately as possible, his hair, his nails—which accounts for the preservation of parings, his food remains—he will not leave banana peels lying around,—his clothes, his bed, and even his vermin. JAMES enlists our vote in favor of his definition by appealing to our ancient sense.

If the self has such vague outlines even for a scientific psychologist, and since the hue and cry is

on to beware of glib distinctions of mind and body, matter and spirit, I speak without undue hostility of the savage's conception of his "double." It may be a replica, but it needn't. The "appurtenances" described above, may be the individual's double, e.g., the handle of his knife. A metaphysical type of savage, a MAORI, will even speak of something that resembles the "astral body" of the theosophists, a physical life-principle and a sacred life-principle. I understand that at the ISLAND of NIAS, in SOUTH EASTERN AUSTRALIA, and amongst the DAKOTAS, the human body is credited with four souls. DR. JEKYLL and MR. HYDE *was* a simple character by comparison. The self is rich enough to possess several personalities. Bi-presence is a simple matter. SAKHUTO, chief of Khuivi, showed a wound on his back, which he said was the result of someone's having shot at him when he was in leopard form. SAKHUTO could be man and leopard *at the same time.*

This magic road leads to immortality. The dead are to be included in this universe of multiple selves. The four souls of a DAKOTA distribute themselves, one with the corpse, one in the village, one in the air,

one in the land of the souls. The dead are living. They may die again. The estimates range between three and seven deaths before discussion ends, and something is hinted about resolution into the air or transformation into jungle plants. There are some disadvantages in that loss of limbs handicap the facsimile of the body, and that one may be killed though dead. At least there is no immediate end. We are more expert. We may attribute nine lives to a cat before extinction, but with regard to ourselves we improve on the poor beginnings of a calculus of fluxions in the savage by introducing infinite series and summing them at one fell swoop into "immortality."

One may jump to the defense of "normal" thinking at this point and claim that the joke has gone too far. If the outlines of the self are hazy, its center is clear. Let us, we might say, define the ego as a center of participation. One might call it a knot in the ether of consciousness, in the way matter has been described as a knot in the luminiferous space-filling ether. It is this knot that we contemplate in introspection. Here we mine for immortality. Here

is the harbor of memory, intellect, imagination, will, love. Here is an inner integrity—the true self.

But the joke has not gone too far. For almost every one, under Socratic examination, will concede to more than one self. The outlines may be hazy and we may hesitate to concede duality or multiplicity. Yet body and soul are allowed to constitute a duality all the sharper. Civilized dualism is more vicious than primitive duality. The experimental observation of multiple selves or dissociated selves is disconcertingly reliable. To dismiss a large volume of facts in this field as merely "abnormal" would be far from explaining them away. The normal is but one of the faces of the abnormal. Biology has made similar discoveries. There is a clear resemblance to the grotesque selves in the curious, twisted forms that are generated from eggs that have been X-rayed or meddled with in some manner. The two-headed monsters, six-fingered, four-armed physical sports affect me like the two-headed, six-fingered, four-armed souls. Such are the hints of the many in the one and the one in the many. A circle without a center is a pitiful thing,

yet its occasional absence may be a clue to greater significance.

Except that we have become accustomed to it, it is no less strange that there should be a multitude of individual souls. How do they come to be so separate? May they not be fragments of a larger personality that constitutes the One? The drift in that direction is almost irresistible. A dignified way of designating this is by the term "integration," a becoming whole. Man is an integration of physical psychic elements. Society is an integration of man. One may also look upon the evolution of man into a larger Man-Self, as a kind of healing process of a psychopathic divided individuality which had become badly divided. The analogy is not a futile one. I confess something inside bobs up and down in violent approval when it is stated. Is that faith?

We wander on the same magic road to immortality as the savage. The "social self" is also a finite structure reaching into the infinite. We, too, are abject worshippers of continuity. It is a perennial device to stave off the end. We inevitably choose a conception

of self that will admit some form of immortality sooner or later. Even the bold spirits who conceive mind as a physical category, who teach that the human self is inseparable from the human organism, are confounded by the discoveries of biology of the continuity of the organism in the somatic cells, which are relatively immortal, and by the discoveries of physics of the four-dimensional flow of the universe set in an awesome background of a yet more subtle immortality. The devices of relativity supplement the devices of infinite series. It is orthodoxy almost, now, to avoid unsafe distinctions between the real and unreal, in the name of relativity. Yet the primitive hairy Ainu of Japan, and not EINSTEIN, are our precursors, for they say of the dead, do they, that "they look upon persons who have not yet crossed the river of death as ghosts, and consider themselves to be the natural and substantial people. They think of us, in fact, just as we do of them."

The interaction of the selves is a never-ending curiosity. The love of one's self is blended in the face of all contradiction with the love of other selves. Were it a matter of chemistry we should call it af-

finity and consider it explained. Then we would institute experiments, make measurements, derive laws. In trying the same for the atoms called souls, however, we may easily overreach ourselves. I do not think it fruitful to compare the attraction of the sexes to that of positive and negative electricity. Nor is it profitable to announce a law of attraction of personalities, like NEWTON's law, depending on a product of two factors and varying inversely as the square of the distance, at a time when NEWTON's law holds not even for material atoms. Much more skill than that is required to uncover the deeper connections. One must account for conflict, contrast, variety, impulses of freedom in the self, and what not. A pseudo-science of the self will run all the risks of little learning. I consider as more scientific than many an attempt at a formula to cover the self, the exclamation of SCHOPENHAUER: "But consider the matter! What is it that cries, 'I, it is I myself who desire existence,' that is, not you alone, but everything, simply everything that has a trace of consciousness. Consequently this wish in you is precisely that which is *not* individual, but common to all with-

out distinction." A science, as well as a philosophy, can be built on such a discovery.

The search for the common element in all selves has produced a young boisterous science of psychology. It has brushed aside hoary centuries of philosophy concerning the self, a vast conflict between dualism and monism, and between materialism and spiritualism, substituting experimental and explanatory schemes. In the course of the conflict the terminology shifted from "soul" to "mind" and from "mind" to "experience." Whether the content of the terms has shifted much is not quite obvious. If the soul had certain qualities and we were to find the same qualities under the name of "mental faculties," I should conclude that a dilution had been accomplished rather than a simplification. It would merely indicate that the word "soul" was too definite and distinct, and that the word "mind" was more tolerably *hazy*. The further introductions of "experience" also seems like refuge in a more foggy climate, because "mind" has become too definite a concept. What next? Gestalt?

When thinking was more positive, it was possible

for ANAXIMENES to announce that the soul was air, for HERACLEITUS to declare it to be of the nature of fire, and for the mystic PYTHAGORAS to describe it as simply a harmony. The dualists were quite as definite. For PLATO the soul was the intermediary between ideas and matter. It knows the first and is bound to the second. It is well bound for the HINDU sage who describes the body as "the sepulchre of the soul." It is the reason the EGYPTIAN priests gave PLUTARCH for avoiding fat. A fat body would weigh too heavily upon the soul. That lofty, ineffable thinker, PLOTINUS, is still a dualist when he speaks of the soul which is "everywhere present without surrendering its identity, penetrating everything without mixing with it." AUGUSTINE is a bit more synthetic. Soul and body in man combine to a third substance, but the soul itself is simple, immaterial, spiritual, and immortal. Even DESCARTES, who taught us to doubt, doubted not the clean cut separation.

The victory shifted to the monists, who, of course, had to split into the two camps of materialism and spiritualism. The philosophical giant of the spiritualists was LEIBNITZ who declared all reality to be

psychic in character. One must read BERKELEY, HERBART, FICHTE, LOTZE. One is tempted to let LOTZE speak in the grand style: "Self-existence, or selfhood, is the only definition which expresses the essential content and worth of that which we, from accidental and ill-chosen standpoints, characterize formally as *realness*." As a clue to this sentence I will say that he is saying the same thing as LEIBNITZ. The style for the materialists was set by DEMOCRITUS of old, with the postulate that souls were exceedingly fine smooth atoms. It was the creed of EPICURUS, and was noble indeed. In its modern forms it became mechanistic. To GASSENDI, HOBBES, HARTLEY, the soul reflected mechanical processes of vibrations. And wasn't SPINOZA, with his substance that is psychic and physical at the same time, a materialist in the philosophic sense? Is he not the forerunner of biologists like HAECKEL and JACQUES LOEB, who made matter psychic?

Concurrent with the philosophic speculations there is the amazing mass of description. Parts of the soul are described with considerable assurance. Consider the GREEK scheme: reason in the head,

will in the breast, desire in the rest. ARISTOTLE introduces centuries of discussion of "mental faculties." LOCKE finally substitutes *powers* for *faculties*. LEIBNITZ speaks of *tendencies* instead. Magic words begin to rule the unruly ocean of psychology. They are "association," "mechanics of ideas," "mental phenomena," "mental states," "immediate experience," and lo, and behold, we are in the forests of a science. Enthusiasm waxes. A "psychology without a soul" is announced. Qualms of conscience assail some. It is like the play "Hamlet" without the character of HAMLET. Yet the Moloch of Science requires even the sacrifice of children. The spiritual "soul," the crystalline "mind," the intimate "individual," "self," "ego," even the heart-warming "stream of consciousness" are lost. The "subject" now has relations to "objects" by cognition (perceiving, knowing) feeling and acting.

The outstanding article of faith, it seems to me, in modern psychology, is "no mental modification without a bodily change." It is hard to see how that could be proved, but it is openly or tacitly assumed. The study of reflexes, stimuli, reaction time, the

marvelous complications of the nervous system take their root in this article of faith. There seems to be a great deal of immediate cash in the 10,000 million cortical neurones of the brain to pay for all possible mental states, including that of the experimenter. Yet, something seems to recede further back from the probing needle of the physiologist. That something is the *self*.

Scientific exuberance has imposed the trappings of method on psychoanalysis and psychical research. The former is adept at springing upon us a host of "repressions" from the "unconscious," so that one wonders how it all could have been stowed away. The latter suffers from an astonishing lack of interest on the part of normal people in their own immortality. It is an unpleasant topic that had better be drowned out by business or jazz. The mysterious regions have therefore been the stamping ground of rather bizarre discoverers. I see one has announced the psychic organs to be not only the brain but also the solar plexus, the spleen, the appendix, and the navel. Reincarnation, too, has become a "science." I admire the accuracy, if nothing else, of the trans-

formations of ALEXANDER THE GREAT into a Jew in the 1st century B.C., into a Roman priest of APOLLO converted and martyred in the 2d century A.D., becoming ALARIC in the 5th century, CHARLEMAGNE in the 8th, ABELARD in the 12th, the BLACK PRINCE in the 14th, and horrors, HENRY THE VIII in the 16th.

I expect the pendulum to swing back. Though they are very modern children, the Gestalt psychologists are stressing factors not of the mechanical type, emphasizing plasticity of the mental life, and following analogies of growth, musical composition and the like. In mental life as in music the melody transcends the mere notes. The ideas of form, as old as any philosophy, are reasserting themselves. I find myself nearer to an understanding of IMMANUEL KANT's denial of the possibility of systematic analysis in psychology altogether, and his belief that it could never be explanatory, like physics, because it did not admit of mathematical treatment. BERTRAND RUSSELL, who dislikes KANT, also thinks nevertheless that different kinds of causal laws apply to physics and psychology. What ties physics and psychology in the same world, after all, is a "neutral stuff." I think he

learned his caution from KANT, who puts it, "I am conscious of myself, not as I appear to myself, nor as I am in myself, but only that I *am*."

I do not expect the conquest of psychology by biology, especially by the technique of classification. An unsung genius of the last century, in an excess of zeal produced, the following extension of classification:

Incorporealia
Order I. Infinitum, one genus without plurality,
Deus
Order II. Finita, angels good and evil

I cite it because it is typical of certain kinds of heaven-storming by science obscured by terminology and carrying a false air of dignity. At the same time FLAUBERT was right in his description of BOUVARD and PECUCHET's explorations in the bosom of the self, "and for a fortnight, after breakfast regularly, they hunted about at random in their minds, hoping to make notable discoveries, and made none and were much surprised." One gets into a dreadful quandary. Perhaps the diet was not balanced. I sup-

pose PLATO was right in the assertion, "if we are ever to know anything purely we must be separated from the body and contemplate the things themselves by the mere soul." But he left no instructions as to how that was to be accomplished. Ecstatic trances have been preached and have been tried. Somehow one is reduced to silence. "Of that ineffable substance which we call Spirit he that thinks most will say least," says our own EMERSON. Nor do I expect certain solutions in religious garb to help us much. I do not see what is accomplished by saying: "Man is the incarnation of the Logos" or "God made souls." I do know that such statements have led to historic debates as to the particulars. No wonder the church cannot decide between the doctrine of the Traducianists and that of the Creationists. The former know somehow that souls are generated from souls, as bodies from bodies; the latter are certain that God creates a new soul for each body that is generated. Can anything be more futile? That is where science may have the last laugh.

I see a great deal more of subtlety in the intuitive phrasing of COLERIDGE: "Self-consciousness is ground-

less because it is the ground of all other certainty." The same breath of conviction emanates from FECHNER's vision of a living universe. "Man lives upon the earth not once, but three times. His first stage of life is a continuous sleep; the second is an alternation between sleeping and waking; the third is an eternal waking." To such a man I would entrust the rudder in a trip through the visible world to discover the invisible. I think FECHNER feels the dynamic, forward-going nature of self. As I see it, the scientific and introspective study of the self must be supplemented by the biography or history of the self, in order to seize the precious principle of its *flow* and its goal of *hope*. I venture, therefore, to conclude with a brief biography of the origins, growth and flows of the selves that constitute me, if only to illustrate the factors which are so familiar that they are missed.*

It seems to me I know not a little of FECHNER's first continuous sleep. It may have lasted myriads of years. It might have been at the age called by us four, five or six years, at any rate before one tolled off the

* Hegel knows that well. "Das Bekannte überhaupt ist darum, weil es bekannt ist, nich erkannt." In German this has the vigor of a pun.

years at all, that I left that larger universe for a vivid, bright self that was a compounding of exhilaration, wonder and desire. There was a rare luminousness of dawn about things then. Yet, soon, all too soon, the day was to burst upon this self. I remember standing on the stoop of a house in a provincial town. A copper sun was beating down mercilessly on a sandy street, small brick houses and a massive stone monument. I was cooling my scorched feet in the shelter of a small tree, when a red streak rushed by with siren screeching, snorting and fuming. It was a red car that some plutocratic prince was driving at break-neck speed. As I shrank within, the sun burnt hostile, the dust swirled fiercely, and the illumination came that *there* was the dangerous, shifting external world, and *here* was I, a self. I had used the term "I" before, of course, but now it *meant* "I," an organization, self-conscious, fated to combat the world. The phenomenon baffles further description. To be understood it has to be recognized.

The next self sprang into being on visiting a foreign land, and suddenly becoming aware of the

strangeness of man. The alien motif brought out something that identified me as my own species, or rather, my own clan. I was now a "kind" of self, because there were other selves. A shouting mob, a landing at a dock, evoked new orientations and new discoveries of self. The secret sculptor kept chipping off bits of the matrix of personality.

New strata have been appearing ever since. At 15 there had emerged yet another self. The intellect had started on its egotistic career, via the gladiatorial sport of solving mathematical problems. Now I was APOLLONIUS battling with tangent circles, now I pondered over number, and felt the presence of an endlessness of thought. At 17 or 18 the aesthetic self sprang into being, and went to pathetic extremes in art appreciation, romance, and voluntary suffering. Chronologically next came an outburst of will—the creative self, the self with "an axe to grind," the self with a mission. It was defiantly ethical, philosophical, a bit intolerant, but at bottom a foe of bigotry and constructive in all its turbulent criticism. It is this self that carries one *furthest*. It is creative in the sense that it recreates itself. Is its goal a superself?

Darker stirrings abound. There is something in this kaleidoscopic mine that seeks to escape from the categories themselves, from mere mental life, from space, time, cause and effect. I call it the *synfinite*. It synthesizes the finite and the infinite. It synthesizes the two impossibilities of birth and death in the transition of being. My view of self, then, is mobile, adaptable, hope-laden. The physical universe is in it or of it. It is neither finite nor infinite. It is synfinite.

I should picture the potentialities of self as the spokes of a wheel of infinite reach from the finite hub of attention. I should let the wheel revolve in curious day-dreams, and spin magic poems. The wheel of the outer world does enmesh with the wheel of self. At times I should prefer not to tell them apart, except by a gentle difference in illumination. And when they are truly synchronous, I shall be happy.

SOCIETY

SOCIETY

I SHALL NOW scan the smaller worlds.

Chief of these is the world of people. It is the bewildering mass of humanity that envelops us, shields, assails us, frees, limits us, leads and occasionally is lead by us. It is our home, our prison, our citadel. To characterize it is to scale dour mountains, to dig treacherous mines, to sail rebellious oceans. To comprehend it is to review centuries, probe the ages, marshal eras. And then a great deal more.

Generations of optimists and pessimists, believers and sceptics, saints and sinners, have woven the spells of the world. An avalanche of epithets advances upon us. A stately bark on dangerous seas, the Statue of God; a great dance, a caravanserai, an inn, a tree trunk full of ants, a hive, a labyrinth, a stormy sea; in another mood: a speck, a trinket, bubbles; further: a bias-bowl, a tennis ball, an eggshell, a hollow-nut, mine oyster, a bundle of hay, a fishing net. Someone

speculates that it was never made, another that it is in a go-cart. It is a stage, a fleeting show, a wheel, a staircase, a perpetual see-saw, a children's merry-go-round, a panorama. It is a bloody slaughter house full of fighting and of love, thy school, O misery, a wood in which all have lost their way, and just plainly "for sale." And, finally, the discouraging note of Isaiah: "The nations are as a drop of a bucket." The Babel of opinion is drowned by a dread prophetic warning of the total insignificance of the chief actors. Yet they are the only talent we have.

The present billion and a half of the curious species that occupy the scene is motley to an extreme. One must remove oneself to a great distance to gain any perspective at all. One must incidentally find a Time-machine to obtain a chronological slant of minimum distortion. One must, above all, find a key to the myriad doors that may open to an understanding of the masses and the classes. Thirty million new human beings appear on the crowded stage every year, thirty million disappear. The new blood brings new problems. In fifty years there is an entirely novel set of geniuses, mediocrities and

idiots, of highly polished, world-conscious men and women, of pygmies in the jungle, of Eskimos, of Bushmen, of the inspiring and the perspiring, of the good and of the evil. New whirlpools for old. To us, swirling with our own tide, the view ranges from domestic charm to an instinctive dread of the foreign, from commonplace to severe criticism, from patriotism to a sense of the all-human. Besides, if man is the measure of all things, what is the measure of man?

To choose from, there is history, there is sociology, and there is the philosophy of progress. Perhaps they can take the measure of man. After what I have said of the measure of the physical world, and of the measure of the individual self, I feel that I am seeking great woe in this problem of the measure of the social protoplasm. I do not know too definitely whether it be protoplasm or organism, form or idea, rhyme or reason. With regard to it I am aware of a hope that it will not disintegrate on analysis, and will not turn out to be a will-o'-the-wisp. Indeed, being less intimate than matter and self, it may seem more simple.

Not merely the passage of time but the passage of forms spells history. Were there no change there would scarcely be history. The change, moreover, takes the shape of some form of evolution. The mind refuses to see it as merely chaotic, since, anyhow, the chaotic is only a synonym for the momentary. The flow of things in itself unifies and orders them. In mankind it is as curious and as baffling as in the individual, and constitutes, I believe, a safe parallel.

At one time varieties of history showed promise of multiplying like novels, which are varieties of individual biography. The psychological roots were the same, the stem was the same, the branches were different. Application followed suit. Lives of great men all reminded us of this and that historic virtue or cause of progress. If in the end we could not make our lives sublime, it was because we did not understand "history." I fear me greatly, however, that it was because "history" did not understand us. HERBERT SPENCER felt strongly on this matter, when he warned, "And if you wish to understand these phenomena of social evolution, you will not do it though you should read yourself blind over the

biographies of all the great rulers on record, down to FREDERICK THE GREEDY and NAPOLEON THE TREACHEROUS."

We have, accordingly, a large group of historians, wielders of intellectual spades, who have been reviewing the doings of the world from the viewpoints of specific values. It would be as easy to be impatient with them as with the "great-man" theorists, that is, individually, if their safety did not lie in their great number. In ensemble they represent that many-faceted, prismatic view, which does reveal a richness of texture in the world of events that would otherwise escape appreciation. The aegis of evolution rules almost all of them. We are treated to studies of the evolution of customs, arts, morals, all forms of skill, art, the mind itself, economic forms, political institutions, religions, all in the guise of the scientific. The scrupulousness and the sincerity of effort to avoid bias in these narrower efforts are impressive. The concentration of attention involved in chasing one item through the ages, on the whole leads to greater honesty, though it constantly runs the risk of becoming detached from the living body

of fact and of becoming a very faded ghost of reality. I look upon this body of historical workers as upon the humble experimenters who produce the data of science for the theoretical gymnastics and olympiads of the synthetic intellects. But I am not rash enough to mention names or even to commit myself that I know any such intellects in full flower.

Another trend is represented by metaphysicians and mystics, who seek a symbol and a norm for world forms. A past phase has been the ethical interpretation of the world, à la HEGEL. One cannot fail, however, to perceive that it is bound to be ethnocentric, determined by the racial ideals of the thinker. Again there would be safety in numbers. The most modern forms, however, are morphological, structure-searching. They are steeped in a weird seeking for significance of a deeper order. Its votaries traffic in revelation. In history they see a process anti-evolutionary, anti-scientific, and, perhaps, even anti-systematic in any sense. Time in history is *not* the same time as in physics. It is almost ineffable and is saturated with destiny. Normal notions of progress are not applicable, because one cannot speak of im-

provement at the mystic level of the direct perception of historical significance.

It is a proud boast of SPENGLER, the leading spirit of this group, that he is completely independent of any bias. The personal bias is the least of the matter. He asserts his independence of the bias of his "culture." A culture is a form of life conceived as an immediate expression of spirit, a spiritual organism, a vast, self-contained animal as distinct as any individual. Its career, furthermore, is a matter of fate, or rather destiny with a capital D. This determinism is more iron-clad than any of the most obstinate materialism. I say this because the mystic crystallizations of cultures leaves no room for *random* motions, whereas mechanism and materialism do. The shift in viewpoint is strikingly, though egotistically, put as a change from the Ptolemaic to the Copernican view of history. If it were true it would constitute a great achievement. But aren't we yet to hear of the Relativity View and the Quantum View of History?

I suppose a relativity view of history would find some sort of curvature in events that would impose a kind of four-dimensional twist on biography.

Something occurring on the 4th of March, 1925, would find its subtle correspondent on August 12, 20,008. One might have periodic birthdays. The dimensions of the discovery of America might correspond with a set of similar values for an event in Paradise or possibly in the converse. Yet I must not forget the discontinuities in the mirages of history. Quantum ideas might discover to us suddenly that we do not exist purely and simply, but that there is only a *probability* of our existence. At times we may be following one orbit, at times, another, and we may pass from one to the other out of time and space,—by quantum-jumps. We may prove to be a concoction of the logarithm of the probability and a phantasy of the square root of minus one, the unit imaginary. The principle of uncertainty would put a definite limit to the knowability of historical experience altogether, which, worst of all, may turn out to be just an endless train of wavicles!

The discipline, which leans on history, yet uses its own methods of investigation, is the ambitious young science of sociology. As I see them, its goals have been and are to give first, an anatomy of society,

second, a physiology of society, third, a psychology of society, fourth, an evolutionary account of society and fifth, a statement of general laws. Its major achievements are descriptive, its general laws are generally unaccepted. One is still tempted to say of sociology, what KANT said of the then young chemistry, "Eine Wissenschaft, aber nicht Wissenschaft," *a* science, but not science. The emotional complications, from bigotry to the most unconscious bias, are important in this field. What a seething mass is the heart of one individual! How unpredictable are men! Yet we undertake to find rhyme, reason and order in the structure and progress of the millions. What complex phenomena there are, by what methods and by what safeguards we may ward off prejudice, it is the task of sociology to teach. Only then may it take rank with the established sciences, and, by virtue of its subject matter even become the superscience.

In a way, I have often thought, it may be fortunate that such pitfalls are known to exist in the enterprises of sociology. If all of us were to wear the same colored spectacles, all would agree that the

world was green or yellow or maroon. There would be peace, but not necessarily truth. We are fortunate in having the color-blind, the myopic and the astigmatic with us.

The study of social spectacles involves painstaking winnowing of the chaff from the wheat. How long will it take the classifiers? What logic is there available to refute those who see in history and in society only the record of remarkable persons, those who see only the hand of Providence working in inscrutable ways, or those who will not admit the possibility of a science in the name of free-will as the basis of human conduct? Our emotions betray us, our education is the very stumbling block of our learning, our theology makes us imagine all outsiders merely as fit subjects for hell-fire. The hope that guides the earnest observer, intent on being impartial, is that when the prejudices are set down side by side their governing principle will be discovered, and then, perhaps, some compensating rule of transformation will be found.

At the very outset, in all historic, sociological and philosophic probing of man, there is no consistent

and definite understanding of *human nature*. It is a delicate nucleus well crusted over by *human nurture*. And no one seems to possess the discriminating sharp scalpel to pry the two apart. H. G. WELLS is thrown into despair by this unfortunate basic principle. Note this: "Socialism is against human nature. That is true, and it is equally true of everything else; capitalism is against human nature, competition is against human nature, cruelty, kindness, religion and doubt, monogamy, polygamy, celibacy, decency, indecency, piety and sin are all against human nature. For human nature is in perpetual conflict; it is the Ishmael of the Universe, against everything and with everything against it." Now, what is it?

It is doubtful whether any standard human nature is near discovery. The Columbus who finds it will probably mistake it for something else, and he may squash the delicate egg in the process of standing it on end. It is safe to say that almost every suggestion that has been made has turned out to be nurture rather than nature. I do not wish to imply at all that there is a contradiction between the two. Nurture is the derivative and complex, nature is the

fundamental and simple. No one has yet identified the simple. Does it avail us much to change terms, and speak of *instincts,* instead? MCDOUGALL, I think, lists fourteen or fifteen. I suspect that if I did the counting I should find more. But it is not so much their number as their quality that bothers me. If there be a psychological element called the instinct of acquisitiveness, it may produce as its expression anything from a harmless collector of butterflies to a miser, a scalp-collecting hunter, a Bluebeard. To the sex instinct have we not attributed every variety of good and evil? Aggressiveness is alternately lauded and despised. In application or in expression the doctrine of instincts does not simplify. All roads diverge from Instinct, as if it were a God. The explanation is too good. The "will of God," for instance, does answer any question that may be asked, as why does it rain or why does it not rain; the caprice of instinct also does account for any conduct, but neither God nor instinct furnish the "how" which satisfies the human mind more than an omnipotent "why." It is by small differences that explanations advance. Human nature will have to be

mapped and remapped as it appears in the gross. Who knows how much will have to be stricken off before it is rated as net?

The body of morality, perhaps, contains in itself an explanation of society, but who has traced it? It is a vast forest of contradictions, and it is very much tangled. The absolutist of ethics has his match, perhaps more than his match, in the insatiable sceptic. In between there is every shade of optimistic and pessimistic arbitrator. The principal sport in this field of research seems to be to check any and every moral principle held by one group by the very opposite notion held by another group. The battlefield of cancellations is dotted with buzzing zeros—a nihilistic paradise. The prophet of "beyond good and evil" is drowned in the whirlpool of the zeros. The "superman" has become a wasting zero. The scientist stands perpetually deadlocked by indecision, like BURRIDAN'S ass with the bundle of hay on one side and the pail of water on the other, both of which he desires with a petrifying mathematical equality.

In spite of the 4000 answers given to the problem during the last 4000 years, a feeling haunts me that

something absolute may be lurking in the very relativity of social forms,—a conditioned absolute or an invariant. Is it the same old "human nature," as obscure as the soul, the self, consciousness? Is it a definite human extract which tints all conduct? Or is that, too, a bit of transitory egotism which the passage of time may cure? I repeat, nevertheless that there is hope in the multiplicity of answers. The new truth will be a richer truth thereby.

The helplessness of historians, sociologists and moralists with regard to a reconstruction of the past is but an echo of mankind's non-plussed attitude toward the future. The future is mercifully veiled from the individual. Thus on the material plane too the fate of a particular atom or molecule is unpredictable, but the conduct of swarms may be reckoned. Might not one expect the fate of social groups to be calculable? Might we not agree with TARDE: "We are told that our body is a little condensed air living in the air; might we not say that our soul is a bit of society incarnate living in society? Born in society it lives by means of it?" The body politic would be, say, as definite as the solar system or a spiral nebula.

If there were but a NEWTON for the social realm! Yet, we who have seen mechanism tottering in the physical sphere, should we not hesitate to wish for such a success for sociology? Perhaps, when COMTE named it social physics, he spoke better than he reckoned, because physics is now more strikingly psychical than a great deal of psychology. Indetermination or freedom, too, may be raised to the force of a scientific principle.

I see that a brilliant group of intellectuals has been writing a series of little volumes about the future of various elements of culture, organization, research. They are all written to the same refrain, "I may be *all wrong*. But I think so and so is most likely." Where others flew we are learning to creep. One speaks now of probabilities, and at the same time prepares one's alibis in the event the prophecy should fail. The fire-snorting prophet cannot unchain eternal truths from the sticky mass of detail and matters-of-fact. The loss in dramatic power in forecasting is, in spite of all temptation to wax enthusiastic about insight and intuition, a sign of greater and not lesser knowledge. At least this is true—wis-

dom thrives on silence, and hope thrives on uncertainty.

The uncertain art of history and the uncertain science of sociology have produced a still more uncertain philosophy of human progress. A. J. TODD, who has apparently scoured the world literature on the topic, notes the entire gamut of opinion from flat denial of progress to fanatical rhapsodies concerning it, but himself speaks in the subjunctive mood. He is modestly content that it is theoretically possible, not really necessary in the nature of things, and *should* have objective tests. Aside from that, it seems, it may do one good to become acquainted and mingle hopes. The review is excellent, yet I do not find in it a recognition of a stricture I should make at the very outset of any such discussion. *Progress* is a term denoting a relation. There must always be two members of a progression between which there is a state of progress, regress or of no change. To me therefore progress may be both possible and impossible, necessary and unnecessary in the nature of things, and may or may not have objective tests. It all depends on *what it is that is tested for progress.*

Whether there is a total progress, like the definite integral in the calculus, depends entirely on the synthetic (and mathematical) talents of the observer, and his willingness and ability to add seemingly different things. If it is shown that in a specific family progress or improvement in physical development has been definitely linked with a mental deterioration, one might take the two linked series as such for a further study of cause and effect between the two, seek exceptions, parallels, errors, or one might attempt to add the two in a general decision concerning the family, as to whether it has progressed "in general." To me such an addition is not impossible but it would be a feat to make anyone else, besides the possessor of the synthetic understanding, follow suit. It becomes a highly personal matter.

To continue with the issues raised I give a few instances. To illustrate a case where it may be quite conceivable that progress is not even theoretically possible, I would cite the matter of longevity. Is man progressing in that direction, or is all probability of progress shut off by the nature of the life-process in a single cell? It is quite possible that even under the

most favorable conditions, man's span of life is definite and cleanly cut by the number of reproductions his individual cells can make before their senescence carries the organism along in this collapse. There will then be no theoretical possibility of progress in that direction, at least not till the theory is revolutionized by a profounder discovery. Still worse, if we accept the second law of thermodynamics, namely that the universe is running down, we commit ourselves promptly to a belief in the *theoretical* impossibility of genuine progress in any *building-up* process. Right here I confess that I've always looked for some profounder principle to defeat this miserable second law of thermodynamics, because, pessimistic as I may be, I detest so easy and hopeless a defeat. The second law *is* disobeyed, and certain types of progress, which satisfy our ego, are *theoretically possible*. Thank God! But then the opposite ones are not.

The *above* incidentally illustrates the point that some progress is after all present in the nature of things.* What I mean is that on a proper shift of

* Relative to us. Is there any other "nature of things"?

our point of view we will discover progress, if not in one direction then in the opposite. This is a consequence of our dualistic way of thinking in terms of opposites, and our equally dualistic manner of shifting our moods. It is a matter of definition, accompanied by logical jugglery and emotional oscillation. But, why not? I do not agree at all with BELLOC who asserts that "you cannot define any ideal of a temporal kind however limited or however base, towards which there has been an ascending curve of progress." On the contrary, I believe, it is by this very power of definition that you can do almost anything for any ideal, of a temporal or a spiritual order, limited and unlimited, elevated or base. Just look at what had been done by the generations of pessimists, optimists, destroyers and creators! DEAN INGE has reviewed the rosy and the gloomy, and I might add, the adroit. By the adroit, I mean those who have looked upon progress as a cyclic or spiral process. I wonder how PLATO came to set down a period of 36,000 years of improvement followed by 36,000 years of decadence, precisely? ARISTOTLE went the whole hog. The arts and the sciences (for him) have

been discovered and lost an infinite number of times. I think this matter of eternal recurrence will haunt mankind for a long while, and may drive more people to insanity than NIETZSCHE. In fact every philosophy has had its species of progress, a kind of mirror-image as it were. Listen to KANT saying just what KANT should say about making progress: "By fixing our eyes on the goal, which though a pure ideal, is of the highest value in practice, for it gives a direction to our efforts, conformable to the intentions of Providence." And we might add, comformable to the caution necessary to preserve a professional appointment in PRUSSIA. It is just like CLIFFORD to say that scientific thought is progress itself, and precisely like TOLSTOY to pronounce it an inevitable growth and that its aim is simply the spiritual welfare of all men. The peasants, to be sure. To COMTE, positive knowledge; to HEGEL, spiritual freedom, movement of the human will. But why multiply instances?

In the matter of touchstones of progress in items sufficiently specific and homogeneous, the necessity of clean cut *subjective* tests is to be stressed quite as

much as the necessity of *objective* tests. There is no more tantalizing illusion than the one of complete objectivity. The desire for it is in itself subjective,—lest we forget. It is a noteworthy matter that the simplest tests of sociology, such as may serve as questions in census taking, are exceedingly numerous. In an endurance test of penmanship one may write down hundreds of questions that in some way would search, classify and measure a group of population. This richness is the child of subjectivity. The subjective stamp is on property, wealth; on the institutions of the family, local group, national group; on law and government; on public opinion; on language, morals, religion; on money, capital, labor; on technology; on art; on thought. All may be measured, and all may take on new measures. The phenomenon of measurement itself undergoes change. He who will formulate this change conceptually will be a very great theorist indeed.

A conception of very deep human appeal,—and may I say, therefore, likely to be quite sound *objectively*—is that of a social organism. C. H. COOLEY defines "organism" with great refinement—"A vast

tissue of reciprocal activity, differentiated into innumerable systems, some of them quite distinct, others not readily traceable, and all interwoven to such a degree that you see different systems according to the point of view you take." Bravo, very comprehensive! The warring historians and sociologists and philosophers of progress may find therein a common magician's hat from which each may pull his rabbit, his goose, or his cards of chance.

In this kingdom, I see an era of the joint reign of two monarchs. One will marshal the hordes of facts. The other will build numerous lookout towers of speculation. The one will be taunted about his myopia, the other will be accused of day-dreaming and visions. Their progress will seem to be antagonistic. Yet a day may come, a shining candid day, on which the inevitable synthesis will mature. The hope that will come true may be strangely like the notion of PASCAL. Society, in all its apparent multiplicity, may be the individual One, living forever in every shape, and ever learning. It will learn the secret of its organism.

INTELLECT—THE VILLAIN

INTELLECT—THE VILLAIN

THE REGION WE call intellect—where may it be? Somewhere in the mental life of man there lurks a power, a plotter,—the intellect. It is a shadow behind a shadow, which shadow may be its own mirage. The journey of its discovery is unique in that the goal may be just as well behind, at right angles, in another plane altogether, as directly before one. One may not even know whether one is moving altogether. I open with this geographical comment as a possible encouragement to those self-possessed explorers who have stayed at home, or have not succeeded in playing hide and seek with themselves, solitaire. No expensive expedition is needed to find the intellect or to explore it. It is indeed the self-explorer.

The insiduous doubt suggests itself that the undertaking of testing or proving the intellect is a bit of mummery. It is the clever play of a jocose author

who has so thoroughly transmuted himself into his characters that they finally enter upon a search for their author. The intellect has thrown off its creations which re-organize to search for their creator. The pantomime is even more intimately self-owned and involved. The intellect poses the question of the intellect, lays down the rules of the intellect, accuses and defends the intellect, judges, condemns or frees the intellect, bankrupts and rehabilitates the intellect. Each and every one of the players, as well as the author, is yclept Intellect.

The same intellect, I suppose, furnishes its own definition. It is surprisingly modest in that respect, pretending, as it were, that it is not the sole occupant of the mental realm. It takes the alternative name of Reason, leaving room for faculties such as the Will and Desire. This voluntary renunciation strikes me as its most important characteristic. The intellect is self-limiting and self-delimiting. Is this trait responsible for our obsession for the finite?

The intellect, in its shrinking, has made plausible distinctions between itself and other activity. The opposition of the "heart" is curious. There are men

of heart and men of intellect. The heart realizes vision where the intellect is blind. Lovable truths are announced, as that of PASCAL "the heart has reasons that reason does not know." I wonder, however, whether one may not say as well, "the reason has heart-trouble that the heart does not know." I know my reason has. I should go further than BACON in his admission: "The reason of man is no dry light, but admits a tincture from the passions and the will." The tincture, I am afraid, saturates it. It is a concentrated solution, a colloidal gel or sol. I think (and feel) many disputes between the so-called artistic cults and so-called intellectualists which have reached rather amazing subtlety and received mystic injection, would dissolve in an understanding of the artificial polarity of heart and intellect. There is enough both of mysticism and of logic in that.

The opposition of the will and of the intellect had been presented from many an angle, till it had become a commonplace to distinguish between *faith,* an act of the will, and *belief,* a compulsion of the logical intellect. One might have faith in anything, one could believe only what the reason had passed

through its censorship. Heroes of faith were succeeded by no lesser heroes of pure reason. The simple saints had their counterpart in ascetic scientists. Thus CLIFFORD had an ethics of belief, rooted in a rationality that would not yield an iota or a tittle to the enemy. WILLIAM JAMES, scientist though he was, however, broke this crusading spell by his almost unanswerable essay, "The Will to Believe." The strict servant of logic and method was shown to have *willed* his allegiance just as thoroughly as the seeker of strange overtones and other worldly insight. Everyone thinks a bit "wishly." The intellect is saturated with will as well as desire. Its crystallizations are closely controlled by these ever-present solvents.

The most striking contrast of all has been the opposition of intellect and instinct. It is customary to present the former as the adroit villain and the latter as the virtuous fool who has a cosmic guarantee of ultimate victory. The intellect is traditionally cold, dry, analytical, decomposing, yet withal keen, subtle, abstract; the instincts are warm, vital, unerring; though rigid, automatic, concrete. An observer like

FABRE, constantly drives home the unearthly cleverness of instinct coupled with abysmal stupidity. The Lycosa may do all sorts of wonderful things, yet it cannot distinguish a bit of cork from its own eggs. Furthermore, the instincts have a calendar of their own. At the given hour they suddenly awaken; as suddenly afterwards they fall asleep. The marvels cited by HENRI BERGSON seem to transcend any performance of mere intellect, even if man were the actor in the insect comedy. To this most intellectual anti-intellectualist we owe an excellent description of intellect. It is the faculty of making tools. It deals with relations. It apprehends discontinuities only and is immobile. Indeed it has an infinite power of decomposition, yet it is completely *impotent to comprehend life.* Instinct is an alternative channel of evolution which suffers from none of the above limitations. It is of the very texture of the urge of life itself, the élan vital, and hence operates with a smooth logic of its own. The seeming continuity of the intellect is that of a cinema film in projection; instinct is not thus decomposable. It is "it."

If ever there were a brilliant exposition, it is BERG-

SON's. Yet the combined observations of patient experimenters has been rather against his *facts,* not injuring perhaps the value of his critical searching for the creative element in life, but vitiating his distinctions between instinct and intellect, as over-intellectual, in the bad sense. HOBHOUSE soberly sums up the findings that there is "abundant evidence showing that instinct is not always perfect in its working; that it does not proceed on an unchangeable model; that it is on occasion applied mistakenly, uselessly and injuriously; that it is often incomplete at birth, and requires development; and that, at any rate, among the higher animals it is so interwoven with intelligence that the two factors become exceedingly difficult to disengage." The least that may be said about the twain is that they are like Siamese twins; the most, that they are at bottom the same thing.

To say that they are at bottom the same is, of course, not to identify the two, but to assign a common origin to them. For that matter, if anyone were to demonstrate that intellect had arisen from instinct by direct development, it would still be no identifica-

tion; nor would it in any way justify a conclusion that intellect is instinct in disguise, no more than a child is its parents in disguise. There is, on the whole, a very strong probability in favor of some continuity between the two,—provided the definitions of the two concepts are not over partisan. I think MCDOUGALL's definition of instinct would be broad enough as a basis. An instinct is "an inherited and innate psycho-physical disposition which determines its possessor to perceive, and to pay attention to, objects of a certain class, to experience an emotional excitement of a particular quality upon perceiving such an object, and to act in regard to it in a particular manner, or, at least, to experience an impulse to such action." Intellect or intelligence results in a loosening up of the factors of this definition. The rigidity of inheritance is supplemented by elasticity, adaptability, selection. The "power of reproduction" the "knowledge of relations," the "striving after ends by a procedure of try-try again" say various thinkers (LLOYD MORGAN, WILDON CARR, STOUT). These seem to be fragments of ARISTOTLE's "power to conceive universal ideas." Of course, when

we arrive at the classical definition, the gap between instinct and intelligence again appears to be enormous. Therefore we accept the classical only as a limiting case to the vast mass of development that lies between pure instinct and lofty flights amongst universal abstractions.

I do not know whether *varieties of instinct* have been classified in an ascending order, or whether there is any certain, unprejudiced way of treating the matter. How does the mind of the bee differ from that of the silkworm moth? Their actions seem to be stimulated by light. The swarming of the bees may be dreadfully confused by a change in illumination. The moth is also photo-tropic (light sensitive). There are creatures that are sensitive to gravitational pull, solid contacts, the unicellular amoeba, for instance. Is the instinctive mind of the amoeba simpler in essence than the instinctive mind of Ammophila, which, in contradiction to BERGSON, has been discovered to use pebbles as tools? Even bacteria show the simplest reflexes or tropisms. Who, then, will arrange a series from the bacteria to the honey bees? Who will succeed, further in establishing a series between

the honey bees and ARISTOTLE? The faith in the series which, I estimate, includes one-half a million kinds of minds, corresponding to the number of species, was announced by HERBERT SPENCER: "If the doctrine of evolution is true, the inevitable implication is that mind can be understood only by observing how mind is evolved." A long time has passed. Has the faith been reinforced?

Where we got our bodies seems quite definite, where we got our minds quite confused. The study of mental evolution is still in an atmosphere of prejudice. Every story of animal intelligence is open to the accusation that the teller of the story has put his own judgment in the place of the animal's. Yet, allowing for anthropomorphism, there still remains the fact that animals show responses like those of human beings. Similarly, the conduct of animals may illuminate our own "unconscious." Again, human intelligence has not *superseded* instinct. It is rather a supplementary and complementary growth. Shall I use that charming word "epiphenomenon" *

* "Epiphenomenon" was an epithet used for mind or thought or soul by Huxley. The phenomenon was the motion or commotion in the brain, and the by-products or epiphenomenon, the thought. Destroy

and say that, according to not a few, intelligence is an epiphenomenon of instinct?

The animal origin of the intellectual portion of the mind, however, is a bugaboo that is frightening fewer and fewer investigators. The terrific gaps will be bridged, possibly, by detailed studies on the evolution of speech, and writing. The task anticipates the millennium. It would be necessary somehow to study the instinctive and intellectual capacities of man independent of any training or social influences, for it must be remembered that our social inheritance is a large element of our intelligence. No such studies seem to be possible in all purity. We are almost entirely dependent on idiots and madmen in observing the rudiments of mind. Children are too thoroughly exposed to social influences, savages are already extremely advanced. It is almost impossible, except by snatches of personal memory, to reconstruct the child's original emergence from the "great

the motions of the brain and no independent spiritual entity is left over. The epiphenomenon is thus reduced to a very thin vapor. If such arguments are admissible, my guess is that the physicists might well say that all things are epiphenomena of the dance of positive and negative electric charges. I fear nothing is made clear or more intelligible by such concepts.

blooming, buzzing confusion." The savage is already 100,000 years old when he is born. He is already a perfect adept in the adjustment of habits to ends, and is born into a relatively rich social environment, as well. Promising cases are perhaps to be found only in the weird historic accidents of feral children, children who had somehow grown up with the animals in forests, or in the case of KASPAR HAUSER, who had been brought up in a cellar. There *homo sapiens,* without the advantage of the social inheritance of language and various practical acts, may not differ too markedly from a bright monkey. The few historic cases reported turned out to be either idiots or slow learning children. On the whole I think they brought out FICHTE's dictum: "Ein Mensch ist nur unter Menschen ein Mensch."

The situation is also strengthened by the experimentalists. In all honesty THORNDIKE's conclusion is that higher mental processes depend on the number, speed of formation, permanency, delicacy and complexity of associations. Just that. Consequently we have entered upon an era of investigation of mind as behavior, mind as an observable object, and mind

as a measurable object. As you like it. If you are very bold you may even venture to reduce it to a matter of physics and chemistry. A suitable thesis for a vigorous school of mechanists of behavior would be: Mind (or intellect) and the Secretions of the Ductless Glands or Mind and Strychnine. The calm thinker may be a solution of an equation the terms of which are certain brain structures, a low coefficient of thyroid activity and a high alkaline reserve in the blood.

Nevertheless, it is permissible to doubt the sufficiency of physiology to explain intellect or instinct, and not get away from the term behavior. Behavior need not be associated with mechanism exclusively. For that matter, physiology itself is not strictly committed to mechanism. It is an open question whether physiology can explain everything in behavior. It is even a question whether physiology can explain anything in behavior. When I say "physiology" in this connection I refer to the chain reflex patterns of the usual type, without some form of guidance of a non-mechanical order. The troubles physiology has had with things mental may revolutionize physi-

ology but can hardly change the things mental. Indeed pure mechanism has become almost a pure myth in the natural sciences. The field is full of compromises. It is not mere wilfulness that leads men like BERGSON and DRIESCH to postulate a definite vital principle that has no "mechanical equivalent." It is because a sense of value, which is a non-mechanical notion, is to be found even in instinct. Activity, becoming, defy analysis into mere movements. Mere habit is not all there is to instinct. In short, a study of behavior in the widest sense of the term, a sense which would admit non-mechanical as well as mechanical ideas, is likely to result in an interpretation of intellect and mind of a more intimate order. They will be seen to be more "naturally" together. Their harmony exists, if only latently.

The trend toward establishing a continuity, a correspondence and harmony between instinct and intellect as parts of a larger whole, including all of Creation, seems to me to be quite definite. Even BERGSON, who has done his most brilliant to separate them, unites them in the name of intuition. "By intuition, I mean instinct that has become disinter-

ested, self-conscious, capable of reflecting upon its object and of enlarging it indefinitely." Is this not a union? I say this in spite of the firm insistence by BERGSON that the two had parted company "when life launched itself into matter," because I see that they are constantly intermingling in his own intuition.

The final synthesis, I suppose, will be a convergence of the great variety of views leaning on mechanism, purposiveness (teleology) and human psychological forces. It will lubricate the seamy joints of the machine-animals of the mechanist; it will pep up the inadequate hormones of the physiologists; and it will add a dash of human introspective reality to the word-entities of psychologists and philosophers. The biologist will set himself the task of tracing mind in the child right back into the embryo. Low organisms will be classified more and more carefully on the scales of tropisms, reflex action, organic instinct, and the learning process. Imagery and reason will be included in biological study. Physiologists will have to pay more attention to responses of conduct to impulses and meanings, rather

than to merely physical stimuli. There is no sense in blinding themselves to a tremendous portion of psychic life. They should discriminate thus, between the reaction of a dog to a stick and his reaction to a stick with which he has been beaten. The Gestalt Psychologists are in a position to clarify great stretches of psychic life of that order. There is also danger of forgetting that our own self, discovered by introspection, may be the only supreme court of reality and knowledge. This little grain of salt is a persistent ingredient of all truths. I should expect, in a way, the mathematical physicists to turn out to be the most idealistic interpreters of reason. They have the advantage of a remarkable symbolism over those who use mere words. It is they who have recently explained the most difficult matters in the physical universe by a system of algebra in which two times three is not the same as three times two. Is logic still safe?

The methods of investigation too will be expanded. Instinct and intellect are not exhausted by experiment. They have a history. Consequently historical methods, comparative and evolutionary, must be de-

veloped. I still wonder also, when psycho-pathology will come into its own. The abnormal is the best clue to the normal. It is there where impulses may be sifted, the delicate tendencies to suggestibility diagnosed, and the extent of the mind mapped. It is a fact, for example, that actual physical blisters may be raised by suggestion. Does matter, then, completely enslave the reactions of the mind, or isn't the situation reversed? The autonomy of the mind has never been disproved by avalanches of behavioristic experiments on normal beings. It may be made plausible quite readily by a bit of psychotherapy. I feel quite certain that the tide is actually turning in that direction. Nor must I forget to include the philosopher in the co-operative study of intellect and instinct. His duty is two-fold—criticism of the fundamental assumptions and methods of the special students, and a persistent digging on his own part for the ultimate nature of reality. In that sense he may be the distracted, unhappy master of the whole show.

Speaking of philosophers, I am tempted to add a few remarks about their theories of the intellect and instinct. In this respect they illustrate very well

KANT's "there is no philosophy, there is only philosophizing." And when there is philosophizing there is no unanimity. A composite view would be something like the following. The distinction between intellect and instinct should be made, even though it be only a difference in degree. The intellect is largely a subjective concept, the instinct objective. Almost all speak of instinct, but not of *the instincts*. The singular exists, the plural may be artificial. As to instinct all agree it is innate and hereditary. But, to most, intelligence is also that. Some distinguish between instinct actions and instinct feelings. This, I think, is a useful distinction. It is similarly useful to distinguish between intelligent action and the feeling of intelligence. In intelligence, ends are in view; in instinct, the means. But who can draw a sharp line between the end and the means? To many philosophers instinct consists of tiny rational steps, intelligence in large ones. Under the microscope instinct will look like intelligence; through the telescope intelligence will look like instinct.

To multiply instances would be cruel. I stop to note the formal treatment of intellect. The trinity,

conception, judgment, reasoning, as parts of the intellect, is traditional. Out of these intellectual elements the mental alchemists have synthesized all kinds of intellectual compounds. Nowadays the divisions are rather fine. *Perception* precedes *conception* or *ideation*. One of the outstanding puzzles of psychology and philosophy is the transition from perceiving to the vague beginnings of thought. Then, the strange phenomenon of *memory* and the peculiarities of *mental association* must be disposed of before one attacks thinking proper. No fear of my entering upon protracted analyses of these complexities here. I mention them as one does the crowd that troops on the stage after the chief actors. It is a crowd in which the actors tend to be swallowed. Is it this that has made a certain author write a book called "The Curse of Intellect"?

My guess is that the curse of intellect is logic. This creation of the intellect has been the active instrument of its villainy. The vitriolic F. C. S. SCHILLER has called it the "pseudo-science of a non-existent and impossible process called pure thought." To him pure reason is a myth. Fortunately he does not in-

clude all reason, for that would shut off all discussion including his own. There is a vicious circle somewhere, which he describes in the dictum that neither the question of fact nor the question of knowledge can be raised without also the question of value. Reason never travels alone. Contrast with this, however, BERTRAND RUSSELL'S and WHITEHEAD'S attempt at reducing all reasoning to ten laws of the mind and ten auxiliary assumptions. It is all done in symbols that may mean almost anything. The ten laws include the original three, which are statements that identical things may replace each other, opposites cannot, and that a thing can not be itself and its opposite both. RUSSELL is quite certain about the improved logic that "while it liberates imagination as to what the world *may* be, it refuses to legislate as to what the world *is*." Cries, "Hear! hear! this is not logic at all. Psychology is logic. Your concoction is verbalism! Mere words!"

I shall have to allow the cries to die out in the distance, since, again I do not propose to enter upon an account of a conflict among several most interesting efforts to revolutionize logic, that dazzling by-

product of the intellect. Thinking about thinking is running no smooth course at present. There is an insistent chorus of demands of reform which I interpret to be motivated by a desire to include consciously the almost inseparable instinctive factors in the operations of the intellect, at least to allow for them and to learn how to evaluate them. The trinity of conception, judgment and reasoning is probably rather thoroughly colored by instinctive bias. Their bleaching is no easy matter. On the whole, I feel quite certain, the criticism of logic by psychology will enrich both.

Quite different, however, are the attacks on logic which denounce it as an unholy spirit. It has led mankind into a quagmire, immorality, ignorance. It is the infinite decomposer of life. It is systematic deception. It lies and lies and lies. On the other hand most magical powers are ascribed to intuition, which is sharply separated from logic. Genius is above logic in this system of criticism. One spins to dizzy heights if one would but let himself go, let the knotted moorings of logic go. There are paeans of praise for a kind of compound of haziness, laziness and crazi-

ness, arrogantly masquerading under the noble term "intuition." This doctrine is held with various shades of insincerity. It is noteworthy that the doctrinaires find it necessary to argue, using the despised logical tools. "After mature deliberation," says one, "I have decided to distrust the intellect." The modifying phrase is naive but honest. Others are not as direct. In many cases, to be just, there is a disappointment in the workings of the intellect, a reaction from overmuch confidence. It is the wild stampede of the newborn iconoclast, the atheist of one day old. The old god had failed to perform miracles!

True, guidance by reason is hesitant and indirect, while guidance by instinct is unhesitant and direct. When one reasons one *doubts,* as a matter of course. To choose means is to be in a temporary state of doubt. Thinking is the resolution of doubt. Instinct is old resolved doubt, adapted and automatized into the subconscious. Such is also pseudo-instinct, or habit. In short it is easier *not* to doubt. Furthermore, conservative instinct has had its successes. That is why it is instinct and works very well in *old* situations. The intellect, on the contrary, is the pioneer

and is constantly risking failure in *new* situations, and to be sure, is scoring failures. There is no choice. From one point of view, it is the tortoise which overtakes the Achilles of inspired leaping. From another, there is no necessity of its steps being particularly short. In men of genius, the projections of intellect are extremely long range. I am impressed that their penetration has been falsely attributed to instinct or to a de-intellectualized form of intuition. They are intelligence sharpened by delicate association and a greater background of inherited and *acquired* adjustments. If differences of degree between men are a mystery, the difference between a trained mathematician who sees the solution of a problem in an instant and himself as a beginner is also a mystery.

The future of intellect always intrigues my interest. Is there a limit to my thinking? Is there a limit to the thinking of mankind? "Oh, for some strange unheard of power of thought," is the refrain of many a day-dream of mine. My answer, at present, is that with or without new powers which evolution *may* bring out, there will be more and more com-

plex thinking. The direct and simple cause for that is that knowledge is socially conserved. In my comment on children found in the wilderness I noted that only they represented man intellectually minus his social inheritance. The social inheritance is increasing. I do not know whether EINSTEIN's brain is better than PLATO's, yet PLATO could only do some very original work in simple geometry and that thanks to EUCLID and others. EINSTEIN's thanks must acknowledge legions of predecessors for their depth. To the question, has intelligence increased, the answer is obviously, yes, because intelligence is not merely individual. Has the average brain as a structure improved? I do not know, but probably not appreciably, yet it is doing more work and is getting more results worthy of its potentialities. Such as it is the intellect can run a tremendous course. Still, no one can insure it against accident and madness—war, for instance. Individuals can bend their efforts to make it more self-conscious, deliberate and bent on conquest. HÖFFDING said, "We live forward, we understand backward." Let us try to understand forward.

To understand forward. Why not? The greatest love, according to SPINOZA, is the intellectual love of God. It is the aspiration to project the intellect and its instinctive matrix forward to the utmost. I should like to see the *Bee-Man,* a climax of instinct and reason, blended in the perfection of one creature. There would stand the Super-Man! Will he ever emerge through our puerile efforts, as we ourselves have emerged from a more confused creature? To know, there is naught to do but to live forward.

EMOTION—THE BETRAYER

EMOTION—THE BETRAYER

THE WORLD OF quality we love so much is before us. Feelings and emotions, aren't they the very zest of life? They are, and that is why it is so much simpler to reveal them in action than by analysis. The intellectual world has shunned their discussion in the mode of a Freudian suppression, till, I might say, FREUD fully released it. PLATO's charioteer, the Reason, has been very neglectful of both his white horse and his black horse, the noble sentiments and the baser emotions. They have pulled him through many a severe course, but how carefully has he guided them?

A protest may be entered here that at least in literature emotion has not been slurred at all, that, in fact, it forms the central topic of development. I should perhaps agree with this correction, and yet I should be far from satisfied. I should even compliment and shower with praise the work of biogra-

phers. Yet, I have a larger program in mind. The literary contribution is devoted to a special viewpoint. It is description at any cost, by fair means or foul. An author enjoys extraordinary privileges with his characters, and may claim that the type or individual he has created is the one he had in mind. The mark hit is claimed to be the goal aimed at. Again the profound author is as much concerned with the reader as with the characters. His care is to make the reader fill in the *living* tissue in his sketch of the characters. The sympathetic reaction of the reader contributes a varying emotional content to any literary work. This, it seems to me, is the primary reason for the uncanny accuracy of the literary treatment, without its being at all very definite. The identification of the reader with the character is brilliant, yet it is the defeat of analysis and of conceptual thinking. Fiction produces a precious kind of truth. But we need a philosopher, as much as ever, to cut highroads through the massive forests of descriptive suggestion in novels and biographies. He will use them as so much sincere evidence on the life of the emotions, delicate manifestations of

motives, the mazes of love and hate. They are comparable in complexity with the living subject himself, and in a sense may be considered as so many more living types partly revealed. The success of literature lies in a substantial return to the point where psychology and philosophy must begin. Where *they* arrive is another matter.

It is often repeated that early philosophy and psychology overstressed the intellect and intellectualized all conceptions of the mind. Feeling, then, the historians would say, was overlooked in this extraordinary bias in favor of the intellect. I find this chronological formula to be too rigid, and not properly motivated. The presence of some intellectual elements in all theory is not surprising since the intellect is the tool of analysis under any circumstances. It is the circumstances that vary. The circumstances have been against a thorough study of the emotions from the very earliest time up to this very energetic era. I do not believe there was any morbid avoidance of them, but that they were and are bafflingly elusive. The emotions dissolve on introspection. They dissolve even at the mere turning

of the attention toward introspection. Try to think of your anger, and it fades out. Just count ten, without thinking, and it is gone, according to the practical peacemaker. The obvious thing to do with such resistant material is to put it aside, till such time as the simpler problems have been removed. Sensations and sense perceptions seem so much clearer. Ideas are clear. Says LEIBNITZ, "Emotions are *unclear* ideas." If they are unclear, certainly it is a dreadful speculation with time to try to make them clear, and thus destroy them in their distinguishing characteristic. In all periods I find thinkers who have accepted emotion as such and some who have tried to subjugate it under some other mental process. The HINDUS have spoken almost unanimously in terms of a dualism of love and thought. The GREEKS did not fail to contrast mood and intellect. Not so very long ago there were quite as many mystics of the emotional life as scholasts of the intellect. In the immediate present we have divisions that are largely sharpened and detailed forms of differences of point of view that seem to have been born at the very

outset. I should not point an accusing finger at any "dark" age.

What is a feeling is still a highly unsettled matter. How many are there? How can they be arranged? How are they related to emotion? What laws do they follow? All is unsettled. One is tempted to say there are more opinions, ranging from virtual denial of feeling as a definite entity to its elevation to the source of all mental activity, than there are feelings. At least in due time there may be, since psychologists seem to be multiplying like the true proletariat. WATSON contents himself with only *three* curious mechanical response patterns wearing the ancient names of hunger, rage and love. If language is a guide at all, they are simply unrecognizable under these names. At the same time I am alarmed at the number of situations he can explain with the petite trinity. If the situation is mechanical merely, mathematical caculation leads to only fifteen possible permutations of these elements, one, two or three at a time. I fear greatly, from my humble knowledge of psychic life, that these are not elements. They would scarcely suffice for our chemistry, which relies on

ninety-two elements. I have seen the following six proposed: fear, happiness, sorrow, want, anger, shyness. More permutations, but not enough. Others would allow for any number. Enormous lists exist. If, as some psychologists say, they are more numerous than sensations, they may well pass the 1000 mark. Rich as language is in terms qualifying feelings, it will fall far short of such a goal. Who will analyze these compounds, as the chemists have done with their one-half million definitely known structures?

The ceremony of analysis may not proceed, however, without the protest of LIPPS who stemmed the angry tide with the doctrine that the feelings form a manifold of total and *unanalyzable* functions. CORNELIUS and VON EHRENFELS were early moderns who saw in feelings qualities of shape, undecomposable in any sense. The richness of the emotions or of even the simplest feelings suggests to such minds an infinity of nuances that cannot survive the scalpel. Since, even if true in an ultimate sense, this has a totally paralyzing effect on the insuppressible intellect, the analytical ceremony has to go

on. That too is an indispensable nuance. Since analysis refuses to be destroyed, it will continue with these sobering restrictions and safety valves for scientific make-believe.

The question whether feelings refer to a special object of consciousness, or whether they refer to *ways* in which other real acts of perception or thinking are grasped by consciousness, is usually answered in the sense that feelings are an accompaniment of the other functions. That would be unfair if *mere* accompaniment were meant. They are really quite indispensable. ARISTOTLE noted that pleasure is connected with certain physical activities. I suppose when PLATO spoke of the pleasures peculiar to the soul as produced through memory he was no rank intellectualist who reduced everything to cognition, but merely noted they were in company. In the last century BAIN found it necessary, however, to insist at length that each sensation had the added characters of an intellectual and an emotional side. JAMES MILL, along with ARISTOTLE, spoke of indifferent sensations without feelings, while his son was on BAIN's side. It was the school of NAHLOWSKY, WAITZ,

VOLKMANN who contributed a concept that has stuck. Now we say, (not all, of course) that sensations have "feeling tone" different from pain or pleasure.

Without "tone" the classification of feelings is simplified almost to an absurdity. The scale of pain-pleasure has been applied so arbitrarily and with every kind of ethical and aesthetic bias, that it bids fair to rival the famous bed of PROCRUSTEUS into which visitors, tall or short, were made to fit by heroic means. Pain and pleasure are not simple ideas related to the other states, as LOCKE thought, but they are now either nerve processes subject to strict measurement, or, as AVELING would put it in subjective terms, a "modality of awareness." To the latter, feeling is "the experience of pleasure and unpleasure enjoyed by the Self." STUMPF reduces it to sensations related to tickle, itch and pain. There has been a general hanging on to the distinctions of pain and pleasure, pleasantness and unpleasantness, or something seemingly simple like that. Yet the shadings and colorings creep in at the very outset. One may call a taste unpleasant without feeling any pain. One may even find pleasure in some forms of

pain. Then it is hard to see how physical and moral pain can be considered as equivalent by some psychologists. How many times must one eat pie to get an amount of pleasure equivalent to the pleasure in performing a kind act? Still worse, there seems to be no absolute reason for considering pain and pleasure as antagonistic. They may be the same thing which becomes positive or negative purely by virtue of its relation to the general body condition of the subject. We are almost back to the unduly criticized distinction of ARISTOTLE whereby pleasure meant assent, and pain meant negation by the mind. The physiologists may be saying the same thing as the mentalists in their own jargon.

If one dimension will not suffice to measure or describe feelings, how many will? WUNDT has proposed a three-dimensional theory to take care of the three general characteristics of quality, intensity and duration. These do not seem to me to be very simple dimensions. Indeed it is a multi-dimensional theory that lurks in all the simplifications. The dimension of quality alone is an awesome multiplicity. Surely, it is not pleasantness and unpleasantness over again?

Intensity has been fastened upon as a true quantitative factor. Yet I doubt whether of all the physiologists, any one has truly measured the intensity of an emotion. I doubt whether they have measured the duration of an emotion, or the related spatial elements of an emotion, even though it seems to be only a matter of the ticking of a clock. Of all the measurements I have seen reported relatively simple experiences may have been observed, yet they did not consist entirely of a feeling or of an emotion. What also of the feelings of excitement, calm, tension, relaxation that are so diffused as to defy all attempts at localization. What dimensions have they? The tones are not only *not* localizable, but may occur in most inexplicable ways, as if they were independent of sensation altogether. There are sudden changes of mood, for instance, that defy analysis. Anxiety is an emotion of the kind that seems to arise most bafflingly. Anger may occur in mania without external cause. Certainly purely internal conditions can hardly be called sensations. There are tones upon tones, and the matter of dimensions does not exhaust them.

It is high time to interrupt the discussion here to distinguish between feeling and emotion, if possible. I note "simple feelings," which I suppose are the "tones of sensation." When they don't quite behave simply, they are called "complex feelings." An emotion, to take a definition of AVELING's is "the massive and generally unclear experience of coenaesthetic-kinaesthetic sensation." The technical GREEK means something like a bright or dull pressure in the abdominal region. It is very fashionable in some quarters to shift physiological difficulties to the internal bodily conditions, "visceral" conditions. This constitutes a very good reply to any taunt about the failure of instruments to tell the whole story of an emotion. The visceral motions, like those of the brain can somehow be left to measure themselves, and to report the result somehow to the externalized nervous system which is bridled to the measuring instrument. Believe it or not. Moreover, the larger points of view are also in conflict. If we allow MCDOUGALL, who associates emotions with instincts, to describe joy as a feeling because it is not instinctive in his scheme, we must allow CLAPAREDE to con-

tradict him completely and describe it as an emotion. To the latter feeling is useful in conduct, emotion is not. Emotion is the *confusion* of instinct. Emotion is explosive, makes one lose one's head. The negative emotions of fear and anger are the most confusing. They occur when adaptations are blocked. Someone, I believe, has explained the death of birds under the spell of fear induced by a snake, by this consideration. Really, one would expect an instrument of instinct to be more efficient than that.

A wholesome movement, which is on in full force now, is the tracing of the origins of feelings and emotions—the genetic approach. DARWIN's work is the classical starting point, since he considers in detail the expression of emotion in animals. The striking illustrations given by him may be interpreted as adaptations, rather than as mere confusions. Some moderns see a great deal of adaptive value in these "attitudes," others persist in seeing in them breakdowns. They may be separable, possibly, into several kinds. I surmise that some of them may be useful in protecting the individual, like snarling, gnashing of teeth and bristling up for a fight, others may have

more significance for the race, as a general excitability before the approach of danger, because though it may lead to the virtual suicide of some particular individual, it helps the race on the whole, and still others in a miscellaneous class of obscurer, tentative and possibly indeterminate motions. If purely physical systems have indeterminate characteristics, I do not see why in the manifestations of emotions there may not be many random elements. When I speak of indetermination I mean the thoroughgoing indetermination of modern physics, and should recommend it as an antidote to the extreme mechanistic attitude of some physiologist-psychologists.

There should be an evolutionary theory of the emotions, but it may have to wait a long time, as it has, for the accumulation of reliable data. The doubt-arousing difficulty I see in this case is that one is dependent entirely on external manifestations, the results of emotions, their settings, but not the emotions themselves. There is no opportunity for a check-up by introspection. Furthermore, since the same results may flow from different causes, there will be no end of opinion in interpretation even if

the facts are agreed upon. But here, of course, I am directing a criticism not only against the comparative students, but against all of the investigators who stress symptoms and settings because they do not pretend to know how they can grasp the living emotions themselves. The mistake they make is that having said all sorts of things *about* the expressions of the emotions, they either imagine that they have treated the emotions themselves or assert that there is nothing more to be said. Surely we may expect an evolutionary theory at least of the expression of emotion, if not of emotion itself.

Starting with the "tone" of the sensations of an amoeba, deduced somehow from its conduct toward the electric current or chemicals, I suppose a plausible story of evolution may be told. If it is contended the amoeba has no feeling in a differentiable sense, it will have to be separated higher in the scale of life. It will emerge. There may be several stages of emergence. The geneticists have remarkably fertile fields in the study of primitive men and of children. Some psychologists speak already of an emotional age scale. Homo Sapiens comes after Homo Sentiens,

according to JASTROW. The primitive's fears, angers, hopes, and sympathies are almost the total ingredients of his life. Infantilism, according to genetic concepts is the failure in an adult to outgrow early emotionalism as a child. I do not think the series has been drawn with any degree of accuracy or completeness. Suffice it to say that, in spite of their exaggerations, the Behaviorists, e.g. GESELL, are right in gathering data on infant emotions and the like. Possible topics for research are "infant aesthetics," "animal aesthetics," "pithecanthropus emotions," but they surely would be unsafe for Ph.D. dissertations. One thing is certain—we had better study the emotional life of our children more carefully. The practical necessity of such studies of development, especially in an age of increasing nervous tensions, is now well recognized. Yet there is some danger in the offing. It remains for us to pray that no one discovers some emotional vermiform appendix and induces our educationalists to encourage a tribe of emotional appendicitis specialists.

To come back to the neglected amoeba, jelly-fish, molluscs, etc. for a moment, we must ask the genet-

icists to settle the question as to which comes first, sensation or feeling. Are they really associated in protoplasm? I imagine that if they are associated one might as well include a rudimentary will. I mention this not because I seriously expect the geneticists to settle the question in a hurry or at all, but because the simplifying idea may put an end to what seem to be unsatisfactory tendencies to make feelings and emotions appear as secondary qualities or something parasitical on consciousness altogether.

The experimental approach is the talisman of the "scientific" psychologists. Now we are on consecrated ground. Some of the workers have a strong conviction that they are the chosen people. I have heard more than one retort to an objection, with the words, "But this is philosophy!" As if Science were an entirely independent discipline and were not thoroughly rooted in philosophical assumptions or subject to philosophical criticism. One must remember that most of the scientific treatment of emotion in feeling is definitely built on assumptions which may very well be questioned. As I have remarked before, observation centers on the things

that occasion an emotion, as the terrifying object, a sound, a color, and on the outward synthesized manifestations of the emotion, as trembling, striking, blushing and what not. Remembering that the subject under observation usually knows that he is under observation, and that the symptoms of feeling may be suppressed or exaggerated by the subject, and that the *entire body* is probably involved in these manifestations, how much reliance can we place on the reports of the various instruments used in measuring changes in circulation, respiration, muscular tension and the secretion of glands? The names are quite impressive: plethysmograph, sphygmograph, sphygmomanometer, planchette, ergograph, pneumograph, laryngograph, phonophotograph, galvanometer! How deep are we in things when we call them "psychogalvanic reflex"? Why not criticize a bit philosophically (more scientifically) when emotions occur without these instruments registering, and when these instruments register without emotions? No doubt the observations, for instance, that thyroid deficiency is associated with apathy, and thyroid excess is associated with great

excitability, are very interesting medically, but they certainly do not signify that there is a one to one correspondence between glandular activity and emotion. There are so many other contributory causes. A bio-chemist, who knows the tremendous difficulties he has in the mere tracing and analysis of glandular products and in the establishing of any causal chain between them, would be astonished at the finality with which the psychologists look upon their physiological findings. Knowing as I do the forcing that is done in treating the mere chemistry of the matter, I may be pardoned for asking for a re-baking of the psychologists' data. Certainly rage, hunger, and sympathy overlap in glandular registration, but doesn't the brain integrate the action of the glands, and are there not general nervous excitations and are there not ever so many adjustments we know almost nothing about? Certainly. Hence the work, but not the arrogance, should be encouraged. Quietly, some day, we may learn something about the sympathetic nervous system and about secretions. Some day.

"Can emotion be regarded as energy?" asks

MORTON PRINCE. If so, he wants to know the foot-pounds, and wants to find out how it originates in the nervous system, how it arises, say, from kinetic afferent energy of the nerves and transforms into psychic form and then again into kinetic efferent energy of the nerves. If it is energy, he is impressed it must *do* something and cannot be passive in its reception as is assumed by some experimenter, nor may it be a mere thin scum on the surface of nerve reflexes. Foot pounds! Needed: a physicist or a mechanical engineer or a student of thermodynamics to enter this provoking field of the study of energy conversion!

I predict we shall yet have a relativity theory and quantum theory of the emotions, nor may the Lord save us from a principle of gravitation of the emotions!

By no means would science be exhausted. The quest of laws, which is the immediate goal of science, leads to many methods. There are the statistical methods. What goes with what may be discovered by testing and correlating statistically. It is mathematical and is not committed to rigid mechanism. I

should like to cite SPEARMAN's study on egoism or self-esteem and its comparison with half a dozen other qualities considered as good. Egoism receives six versions:

(1) Desire to excel at performances in which person has his chief interest.
(2) Desire to impose own will on others.
(3) Eagerness for admiration.
(4) Belief in his own powers.
(5) Esteem of himself as a whole.
(6) Offensive manifestation of self-esteem (superciliousness).

When these are tested statistically by experiment and are correlated mathematically, the first stands out as quite different from the other five versions of egoism. What goes with what may receive this probability stamp at least. Perhaps the sheep may be separated from the goats. Perhaps, as in the case cited, we are likely to discover will and cognition rather well admixed with emotional experiences. Perhaps the statistical checking of the grosser conceptions are necessary to find out whether disputes are about words or about actualities. When there

is no correlation the suspicion may be confirmed that we are wandering about in the bogs of language.

I hasten to what I consider a just return of psychology back to psychology. The LEIPZIG and BERLIN schools stress a fact quite true even in the biological field that the whole is more than the sum of its parts. There are qualities that belong to the whole as a whole and not by virtue of it being a collection of parts. It may even be maintained that a chemical compound of two elements contains certain characteristics which are not merely the summation of the characteristics of the elements. In chemistry some law of affinity is postulated and may do in a way, but in the complexity of living systems and in the greater complexity of mental phenomena, it is the *whole* that should be the center of interest. Even in chemistry the necessary approach to its present analytical knowledge has been through the study of compounds or *wholes*. In brief, this is the essence of the idea contained in the stress on "Ganzheit" (wholeness) and "Gestalt" (pattern of the whole). Destructive tampering with the characteristics of an

emotion as a *whole* is what makes an emotion lose in intensity and its natural plasticity under analysis, and makes experimentation with instruments so very difficult. KRUEGER, an exponent of this school, would define feelings as qualities of experiences of the total-whole. The analogies that seem to fit best are those of music. Three individual notes have their individual qualities. As a chord, however, there emerges a new quality not a combination of the three. It is these total-qualities which have *weight* or *warmth* or *depth* that are so intimately felt without analysis. The measurement of intensity, so favored by the mechanists, requires the addition of these considerations of depth and warmth to make the account psychologically true. At any rate there remain very many considerations of this sort that must be investigated before the study becomes microscopic.

The treatment of emotion that arises from this stress on wholes is of necessity functional. The emotional wholes perform some function as wholes regardless of their possible elements. The problem of the elements is suspended till the larger groupings are conquered. Consequently we discover phrases as

"the urge to form shapes" (Gestaltungsdrang), "plasticity," "bipolarity of feelings." An emotion is an "organic attitude." The constant question in the mind of the investigator, it seems, is "what use is this emotion," or "what rôle does it play as a whole." Emotion is a motive or the "mover" in many situations. It is also an emergency meeting device. There are such odd things as painfully *feeling* the necessity to complete a gap in memory or in thought, surprising intuitions, rushes of thought; mere thrills as distinguished from permanent feelings, as infatuations against love, and others to be studied. Why will a theme of MOZART bear endless repetition whereas a popular song will not? Why will primitives and children repeat the same flat joke with full enjoyment each time whereas we cannot? The intellectual feelings, what are they? RIBOT's list of surprise, astonishment, curiosity, doubt is extended to include conformity, congruity, certitude, probability, the ideas behind the words *but, if, and, why, after, before.* The feelings are attitudes that easily objectify themselves, and they must be caught on the wing.

To maintain themselves the Gestalt philosophers

will have to develop an experimental technique, even if they have to abandon the adult human being for chimpanzees and chicks. Nor will they avoid the classical conflicts as to the place of the emotions, such as the bombshell introduced by JAMES and LANGE when they bent their energies to prove the paradoxically sounding "we do not weep because we are sad, but we are sad because we weep." Here is how one functionalist has accepted the JAMES-LANGE theory and modified it:

Classical.....Perception—Emotion—Organic Reaction
(bear) (fear) (run)
James-Lange.....Perception—Organic Reaction—Emotion
(bear) (run) (fear)
Peripheral Theory—
Perception—Attitude (of flight), Feeling (of danger)
Organic reaction—Emotion
(run) (fear)

But, I am afraid, others will not agree.

The day of the pathologists of the emotions has also arrived. ADLER would say that after the goal of an individual is established, his characteristics, attitudes and feelings are fixed. No use, therefore, trying

to understand feelings or their disarrangement without a knowledge of the goal or lack of goal to which they are directed. The peculiarities of anxiety require digging for sources possibly in the "unconscious." It is baffling that hysterics may laugh without being joyous or weep without being sad. Will the psychoanalysts locate the causes any better than others? Insanity is being connected more thoroughly with emotional ungearing than anything else. Whatever faults psychoanalysts may show as scientists of atomics, they do point out the necessity of finding hidden motives, mastery motives, inferiority complexes, superiority delusions, and the intimate connection of emotion with sex. No amount of rose water can remove the revelation that some unpleasant facts exist and must be coped with. The hypnotists cannot be silenced very well. Hypnosis has changed the quality of feelings. Theories are in danger. If the JAMES-LANGE theory is strictly true, a subject absolutely anæsthetic should be incapable of emotion. What may be said then if it is shown that under complete visceral anæsthesia normal emotional states do occur?

Who will tell us how feelings are remembered? Are they actually revived or are they ghosts? What are the relations between feeling and desire? The HINDUS *habitually identify the two.* Is that a peculiarity or a truth? Topics for the ambitious: feeling and will, feeling and character, feeling and temperament, feeling and thought. How much of our logic is feeling? Problems, as unsolved as they can be.

WILL—THE MOCK HERO

WILL—THE MOCK HERO

THE WORLD OF energy summons the will as its incarnation. The response of will comes from man and nature in a many-throated chorus of the will-to-live. Will glories in the endless expression of life.

But, is *that* the will? Too much, someone may remonstrate, is as bad as too little. May not one suspect this admiration of energy, force, power, propulsion, to be an insidious religion, which enthralls us as worshipers of strength? Let us not be overwhelmed by this omnipresence of will at the very outset, let us have the smaller will, the human will, the all-too-human, weak, vacillating will of daily life. Let us study the finite before we leap into the infinite. Perhaps, then, we shall learn gradually to rise to a rarer atmosphere.

Such has been the history of the hesitant approach to the question of will by philosopher, artist, scientist and layman alike. I may say that the will itself thus

limited its boasted freedom till at last it has begun in recent times to present itself as a sufficient justification of itself. From the will as barely perceived, on account of its intimacy, there extends a very long evolution to will as sufficient unto itself. The mental characters have a way of becoming autonomous and to set up dictatorships undreamt of in the wildest day-dreams of politics. In ethics the last court of resort is the postulated moral sense. Try to accuse it. It is none other than the moral sense that tells us that the moral sense is good or right. There is a dilemma hard to avoid! Thus, too, the will can set up its dictatorship and look upon itself as the sole source of authority. We will to will. There is another dilemma hard to avoid! A ray of hope shines through all this for the moderates or liberals in thought—counter dilemmas destroy one another. I must not forget to add, then, that it is possible by another modern procedure, the physiological-psychological, to starve will to extreme emaciation, to reduce it to microscopic dimensions. Simply declare it to be an idea accompanying a reflex movement or something of the sort. The reflex is an even more popular dictator than the

transcendental. The reflex justifies the reflex, the transcendental justifies the transcendental. Is not the one the counter dilemma of the other?

The contrast in approach is a useful one to keep in the background, as one looks upon the world of opinion about will. So naturally did the early Greek philosophers find themselves acting that it seems they made no direct note of will and its possible freedom or bondage. Without invading the secret domain of the gods, SOCRATES traveled about little ATHENS studying conduct at home in its practical, ethical, rather than metaphysical aspects. To conclude that the only vice is ignorance, I suppose he had to be a determinist, or a person who believes that action follows a very definite program translatable by intelligence. If he had used the term "freedom of the will" he would have meant probably the emancipation that comes in following the *dictates* of correct reason or insight, freedom from confusion, the confusion of ignorance. PLATO apparently seconded this idea, albeit somewhat hesitantly. He infused another kind of freedom into the discussion, when he spoke of the pre-existent soul making its choice of virtue

or evil before its birth on this earth, before LACHEIS, CLOTHO and ATROPOS, the dark sisters three, daughters of necessity, spun the thread of life. Considering that the pre-existent soul has perfect knowledge, it has always puzzled me, how it could ever choose anything but virtue, and reduce the work of the three Fates to the conventional motions of mass production. ARISTOTLE apparently found more of reality in a kindlier world. He definitely proposed will as a faculty of the soul, and, at the same time, as an element in moral action. Will and desire were distinguished. Desire is the immediate cause of motion. When irrational, it is appetite; when devoted to an end, it is will. It is hard to get a consistent theory of the will out of ARISTOTLE, because he seems to grant will to children and even to animals, but adults are alleged to be deliberate in willing and to quarter that faculty somehow in the territory of reason. Like SOCRATES and PLATO he was interested in painting virtuous action as intelligent, deliberate, principled will.

The fashion of partisan conflict was set by the Stoics and Epicureans. Since the first took the position that the will is determined, the others liberated

it over-lavishly. Strangely the Stoics were pantheists, whereas the Epicureans believed the soul to be made of atoms. For consistency they should have changed theories of the will. Instead we find the odd speculation of those who would be Epicureans at any cost, that the atoms *deviate* from their course, become exempt from the law of cause and effect, and thus win their freedom. Strange conduct of atoms indeed! On the other hand, the Stoics, committed to materialism, describe volition in a rather libertarian manner. Here is their list of stages that is almost modern in its tolerance of the non-mechanical. The stages are:

1. Purpose
2. Impulse
3. Preparation
4. Apprehension
5. Choice
6. Deliberate preference
7. Will of ends
8. Decision (arbitrium)

Certainly they should have been the exponents of freedom.

The same zest of partisanship carries inconsistencies into the philosophies of the early Christian schools. There are THOMISTS through thick-and-thin, and SCOTISTS through thin-and-thick. THOMAS AQUINAS revives the Platonic or Socratic doctrine of the dependence of the will on the intellect, equating morality to knowledge, and allowing the will the "freedom" to chose only what the intellect proposes. Not only is the intellect a motive, but the appetites and external things are motives for the will. And God is a motive. DUNS SCOTUS reverses the rôles placing the "bonum" above the "verum," the will above the intellect. The will is an absolute faculty and brooks no regulation except from the Divine. Yet, God quite arbitrarily creates morality and imposes it on the will as its law. At our distance from the discussion, it seems to me that both schools abdicated, and abjured all rights to freedom before the theological psychoanalysis of God.

Occasionally a spirit arises who attempts a compromise, or another type who attempts a new departure. PETRIUS AUREOLUS goes down into history for his solution of the riddle as to whether the

will moves the intellect, or the intellect moves the will. The sailor, says he, moves the ship, which moves him. I think it is possible to look upon these mutual movements as a kind of mechanism. A finer mechanism, psychological in its content, was first proposed, however, by the notorious BURIDAN. The will requires *motives* for decision. The stimulants of the will are, very simply, pleasure or displeasure. May I give him the credit for starting in real earnest the fashion of asking "how does it work?"

In HOBBES and DESCARTES the mechanistic ideas become very definite indeed. For HOBBES ideas and volitions are movements of the brain. This is so modern! DESCARTES is almost a physiologist. Wittingly or unwittingly he anticipated reflex action, the mainstay of the explorers of the nerves. He is mighty specific in describing the will acting on the pineal gland to produce movement, controlling the "animal spirits" or being controlled by them, directing attention, desire, aversion, assurance, denial, doubt. Yet he admitted so remarkable a thing as the refusal of the will to agree to a truth with the sole motive

of proving its freedom. The man who conceived the human body as a machine, quailed before a purely mechanical will, surrendering it finally to quite a degree of indeterminism, smacking of caprice.

That delicate man SPINOZA flatly denied all contingency. The will is not a faculty, and is but the servant of ideas. *Voluntas* is a mode of thinking. "The human freedom," says he, "of which all boast, consists in nought but that men are conscious of their own will, while ignorant of the causes which have induced it." Far is this from satisfying LEIBNITZ who admits faculties as logical deductions, and hence will as a faculty, a true power to change the actions of body and mind. Contingency is possible because it is infinite. Yet, to satisfy his philosophy, he swings back to almost complete determinism in postulating for this world a pre-established harmony. The perfect world is pre-ordained. Where goes freedom? One may feel a bit free, perhaps, by the sanction of his *principle of sufficient reason,* namely, that there is nothing true or existent, no real statement, without there being a sufficient reason why it should be so and not otherwise, although the reasons cannot

generally be known to us. After all the fuss of argument against SPINOZA, SPINOZA himself might have said that, rather than LEIBNITZ.

Opinion follows opinion in this hopelessly gnarled problem. LOCKE, another determinist, feels some relief in pointing out that freedom belongs to the man, not to the will. Otherwise the will is a simple idea representing a power to choose, rooted in a kind of uneasiness. This uneasiness, to HUME, is a mere impression. Man is dealing here with an illusion which he magnifies into an idea of freedom. If someone should ask, why such associations do arise in the human mind, such a philosopher would probably be forced to confess ignorance. In our own pet way, he would say associations are the play of cause and effect. Take it or leave it, but cause and effect is a common human notion.

IMMANUEL KANT, as the prince of thinkers, deserves a separate paragraph. He divides the world into the phenomenal, subject to the study of science, and an elusive "noumenal" world of things-in-themselves, that is, not merely their properties as observed by us but the things that have these properties. In

the physical phenomenal world and in the mental phenomenal world of motives, appetites and desires, there is no freedom of any kind. In the noumenal world there is freedom. That freedom is a metaphysical and moral principle. Causality is not for this transcendent world. Will, in this rôle, is not subject to the laws of nature. The escape is delightfully adroit, granted, of course, that there be a noumenal world. My impression is that the noumenal world of KANT is a very brilliant creation of the will itself, the will to prove itself free.

The absolute philosophy of KANT satisfies this need of self-justification or emancipation. It has run a vigorous course in spite of many rivals. In Germany it fertilized the thinking of a prodigious group of absolutists. As inevitably as fate itself it produced FICHTE, to whom the will is the *Ego* itself, not a mere faculty but the entire self. His formula is "I find myself as myself, only willing." This important discovery, of course, leads to the conclusion that freedom is the only true being. It is hard to find anything more absolute than such an analysis. Others have tried it. SCHELLING starts with two branches of

knowledge, the philosophy of nature and trancendental idealism. Again the ego is the starting point for the transcendental idealism. We are treated to propositions that the will is self-determining, that it is *Ursein* (primordial being) that the ego is its own act. Again, the seeming contradiction between will and nature is ruled to be out of order by the most high HEGEL. His ALADDIN's lamp is that all contradictions are cancelled in the absolute. Normal, finite logic is not for the absolute. The cancellation, in the case of the will, results in the conclusion that it has freedom as its content, its object and its end. It takes training of a severe order to understand HEGEL in his efforts to aid the absolute. Learn to understand this, as a specimen: "If you want to be anything you must become something," and then perhaps you will see how the will has freedom as its content, its object and its end.

The poetically pessimistic SCHOPENHAUER is paradoxically the most uncompromising optimist as to the significance of the will. KANT had left floating something absolute behind phenomena, the "thing-in-itself" of the noumenal world. SCHOPENHAUER's

thesis may be construed that this thing-in-itself behind matter and nature is the will. The world as will. The world is my presentation and my will, rather, knowledge and will. But, no, elsewhere the issue is raised whether the will is the cause of the universe, and the conclusion is reached that it is not. It is the universe itself. An important suggestion to the physiologists is that every movement of the body is an act of the will. Under his influence later I find, even a very strict scientist as ERNST MACH could see the influence of the will in the movement of the eye. Other subtle corollaries of SCHOPENHAUER are to the effect that willing and doing are the same, although thinking about them separates them; it is possible to take partial views, as it were, and consider will as a phenomenon, as a faculty and to study it as objectified in nature in the form of a gradation from blind force, through impulse, to consciousness. An echo from LEIBNITZ reaches us in the consent that the will is subject to the principle of sufficient reason. But here he is speaking of the will in a narrower, partial sense, the will as phenomenon. This will is not free because it is under the control of causes. As

causes for the will there are the mechanical factors of the inorganic world, stimuli of the organic world and motives of the mental world. It is interesting to note, however, that motives do not determine that I shall will, but *what* I shall will. Thus there remains a kind of general freedom, but only freedom as to particulars. In an individual the character is fixed, and it is really idle to speak of freedom. One loophole is left open,—recognize the Ding-an-sich (thing-in-itself) and that may free you from the pressure of motives. If SCHOPENHAUER were a Christian theologian, he, like them, would have called this thin ray of hope, "divine grace." I wonder how his explanations would look in this kind of translation. When I consider the ebb and flow of systems of thought I feel very closely in sympathy with the solution of another absolutist, LOTZE. It does save much worriment to state that an act of the will cannot be defined or explained at all. It has to be experienced.

With the psychologists of the last few decades it may be best to turn away a while from the philosophical debate as to the freedom of the will, to con-

sider more closely what the will is itself. It may not be worth its freedom. A most determined attempt is now beginning to recede into history, an attempt to derive the will in detail from other mental processes. HERBART drew a picture of an idea below the threshold of consciousness changing itself into a striving toward an idea. That we call the will. When the rising into consciousness is hindered, we have desire. One can easily see then how will is accompanied by action whereas desire is not. To WAITZ the will is a combination of idea and feeling. Desire is an unpleasant feeling because the pleasant idea, which is its goal, is not present in the senses. The notion of frustration of an idea, as the origin of desire, fascinates the psychologist. HERBERT SPENCER, in a similar genetic approach, considers the will as precipitated by the reproduction of the nervous excitation of a former action. That may turn out to be either a physiological dogma or fact. Yet, apparently, he believes that some form of mental representation of an act precedes the act. HORWICZ, who considered both will and idea as developments of feeling, traced the will specifically to impulses arising from feelings of

pleasure and displeasure shown in movements. Surely something like that may be subjected to accurate measurement by ambitious physiologists. Was that the dream, perhaps of MÜNSTERBERG, who had hoped to trace will to complicated reflexes? A triumph for the physiologist of this stamp would be the tracing of a straight line evolution of the most conscious voluntary acts as a sequence of useful reflexes. Man as a machine is to be replaced by man as a reflex-converter.

Stress on emotion has led quite a few psychologists to wander about the field hither and thither. HUME had pointed out that the will was never without an affective or emotional accompaniment. This is no mere accompaniment, according to BAIN. The feelings are the guides of the spontaneous activity of the will or volition. WUNDT and his school made an elaborate study of this guidance. Feeling, emotion and will were presented as stages of a complex process. In very technical words, the apperception of psychical content is the elementary form of the volitional process. In simpler words, to be aware of something is to begin to will. This, I think, is almost

the way to express the opinion of the psychologist ACH, who postulates the "awareness of self" as present in all consciousness of action. WUNDT leaned very strongly toward reducing a conation to the factors of pleasure and unpleasure in the simplest form. During "difficult choices" he filled the emotional reality by buttressing with the concepts of tension and relaxation and excitement and depression. The issues were to be decided by experiment.

Experiment on volition is extremely difficult. Only very recently some success has been claimed from procedures with the elaborate physical apparatus similar to the ones used in the study of emotion proper. Changes in blood pressure, heart beat, and the like are being sought industriously. What may they signify? Will the newest school banish the group following WUNDT's tradition of experiment with introspection as well as recording machines? Self-examination by many subjects is now something of an experimental science. An important matter is to combine it with the technique of measuring reflexes. What is to be measured is the "horme," a term suggested by T. P. NUNN, and defined as the conative

energy, manifested in both mental and biological activity. It is placed on four levels: (1) as an instinctive activity, (2) as a habitual activity, (3) as a determining tendency, and (4) as a voluntary activity. Shades of the philosophers, from harmony to horme!

At WÜRZBURG, LOUVAIN, LONDON, the joint data of introspection and "psychogalvanic reflex" are expected to answer such problems, as whether striving is initiated by feeling; or is feeling a modality of striving, or whether there is such a thing as a consciousness of action, or whether the psychic life is not, after all, merely sensory or imaginal processes. We may expect every pulse of the galvanometer to introduce debates as to distinctions. Already AVELING finds it necessary to distinguish between a volition and a conation. The former is an act of the self by which we resolve, decide, etc., to do anything—is in essence effortless, and is to be distinguished from a conation, of which it may be the cause. A conation is an experienced act, mental or bodily, of doing (striving or effort). The really interesting thing is that the psychologists of this type *are beginning to*

re-discover the will. Most noteworthy to me is the appearance of an interval called a fore-period in such experiments before the stimulus is presented to the subject. In that period there is a consciousness of striving, a kind of alertness, and even a consciousness of self, the self which is striving. A sequence I have seen is as follows:

(1) fore-period (consciousness of striving and of the self-striving)
(2) perception of the stimulus
(3) development of motives
(4) intermediate period
(5) final state, choice proper.

The fourth period is, similarly to the first, a consciousness of *action* and of the self which is active. Only then choice comes. In the scientific manner, choices are distinguished as active or passive. I doubt whether the word passive is really appropriate, but, of course, there are degrees, from consent or habitual choices, almost but not quite automatic, to decisions which themselves range from cold to lively. This appears to me to be a delicate operation of dissecting

away the *will to will* from the *willing itself*. God save the patient!

There is another type of dissection, fascinating and carrying a promise of revelation. It is the study of dissociation in personalities, the strange and often quite baffling changes that occur in disease, under hypnotism, and under the influence of drugs and anaesthetics. Characteristic studies are reported by RIBOT. He rightly sees activity as a sequel to something that precedes it. Call it the will, a state of consciousness, or, if any the clearer, a highly complex psycho-physiological mechanism in which the power of acting or inhibiting has its seat. Psycho-physiological is a word that will admit all sorts of interpretation. It will admit, at least, the reactions that have appeared at birth plus all the complications that are added till the adult stage is reached with a massive accumulation of habit, education, and rational activity. It is this common everyday will, the entire will, which becomes diseased, and it is from its ailments as a whole that something may be learned.

I wish to cite the curious cases of impairment of the will, which seem to prove rather conclusively

that volition is not only permissive but also inhibitive. There is one factor in it which spells restraint, another which liberates. I suppose a person who cannot inhibit his emotions, his anger or his depression, is to be rated as slightly pathological on the side of the will. Such a person simply cannot organize himself to resist the onrush of anger or to dispel a gloominess that enwraps him without relief. A highly abnormal condition illustrates the matter more sharply. The state known as abulia makes two halves of a man. It is a defect in the impulse to activity. Otherwise the person remains quite clear-minded and shows no trouble with his muscular system. Yet there is little movement. One has reported that it has taken him two hours to get his coat off, another took an hour to reach for a glass of water which he wanted. Feeblemindedness has been put into this category because of the usual accompanying want of muscular co-ordination in that condition. Yet it cannot be merely that. One of the finest illustrations of abulia is given by DE QUINCEY in his account of himself while under the spell of opium. Yet he was a man of exceptionally fine mind.

The probabilities are that the motor centers are not impaired. They simply do not receive the proper impulses. The emotional or feeling tones are particularly weak, for it has been noted that recoveries occur under conditions where very great emotional impulses would be expected, as in a fire. It is clear that *volition* and *acting* are separable. The observation of the pathological conditions makes it more clear than the very elaborate experimental technique applied to normal conditions. Another kind of instance of the paralysis of action, due to some blocking of the impulse, is the "Platzangst" or the fear of crossing an open space. The distance across seems interminable or impossible to negotiate. A milder form is shown by people who hug the walls along a street or stick to the brushwood along the road. To the same species belongs "question asking" (Grübelsucht), a condition in which the person asks himself all sorts of hypothetical questions as to what would follow upon a certain action, as perhaps, merely leaving the room. All sorts of dread consequences may follow—the questions bring them out —and one does not leave the room.

An excess of impulse to action is as bad as a lack of it. Some inhibition which works under normal conditions has suspended operation. Again we have full consciousness, but the impulse, whether it be to steal, set fire to a house, commit suicide, becomes irresistible. Prohibition alcohol is remarkably potent in suspending the operation of the inhibiting factor of the will. Although the will may be as good as gone, for instance, when one jumps off the dizzy mountain peak, most cases are such where the will needs and can use assistance. There are numerous cases where the impulse to suicide or murder is known to the sufferer, and he asks for help. Many have asked to be committed to an asylum to avoid the impulse of killing someone they loved, or to extinguish their own lives in some particular way. The will is a delicate adjustment between impulsion and inhibition.

Attention has been the magic wand of certain psychologists, devised to replace the old "faculties" of the mind. This amounts to making "will" an adjective since we have both voluntary and involuntary attention. The voluntary attention also suffers

lapses which resemble the other breakdowns of the will. Inattentive people, men and women who cannot stick to a single topic of conversation, are not rated as strong minds. Yet COLERIDGE, unquestionably a great intellect, lacked the power of voluntary attention to a pathetic extreme. His appearance actually was one of will-lessness. It was neither kind, nor scientific of HAZLITT to say of him: "Excellent talker, very—if you let him start from no premises and come to no conclusions." I should not deduce, however, that our scatter-brained friends are therefore COLERIDGES.

The oddities of conduct that may be called caprice are also traceable to will-trouble. Capricious persons may have their automatic reflexes and emotional acts in a rather healthy state. Possibly we may be unanimous as to the lack of reason as a motive in their acts. Their choices are unsupported by reason or possibly other motives. That much of impulsion at least is not applied or applicable. What price freedom?

The total extinction of the will is probably not possible if we persist in discovering impulses further

and further within. But if the cancellation of both choice and acts is meant, it seems to be a definite phenomenon. Such an analysis may serve as a key in understanding the condition of ecstasy. It is brought on by various forms of monotony, as standing still, repeating some incantation, till one feels only a slight inward agitation. Considering, however, that the whole thing is willed, I should consider this inward agitation to be the original impulse of the will, so that where will seems to be extinguished, it may turn out to be the only residue in a primitive form. However, authority has it that in ecstasy the intellect is maintained, especially when motor reactions are suppressed. One single representation absorbs everything. Yet I cannot very well see the persistence of the single representation without the control of some magnified impulse.

Epilepsy with its excess of motion, and the opposite of ecstasy, is more like a will-less state. Yet that may be due merely to the minimum of the total consciousness. In hypnosis the total consciousness is diminished till the subject becomes an automaton. Again, I fear, he is more than will-less. The study

of how the experimenter's will becomes operative would be of pivotal value for the discussion of all the psychic factors. Yet, what do we know of this most amazing and, at first blush, incredible extinction and substitution of the will? And what will is the somnambulist following, if any? Why will subjects who had been in such states, carry out orders given to them, even when they have recovered, say a week later? Who can analyze the curious excuses they give for certain actions, unaware of the impulsion given to them in the hypnotic state? In their case, at least, is there not a perfect illusion of free-will?

All roads lead back to the problem of free-will. This is true in spite of temporary lulls of interest. It had become a matter of scientific attitude among psychologists to avoid discussion of the freedom of the will. The dissections and the physiological technique seemed remote from so metaphysical an issue. Yet I do not believe it was a case of suspension of judgment or a becoming modesty of the investigators. The issue had been settled for the scientist as scientist. HAECKEL, who had the courage to make

positive assertions of the tacit faiths of his fellows, was unhesitant: "The great struggle between the determinist and the indeterminist—between the opponents and the sustainers of the freedom of the will—has ended today, after more than 2000 years, completely in favor of the determinist." The rhythmic dance of the atoms, completely determined by mathematical equations, was supplemented by the fate-laden data of heredity and nurture, the statistical accidents of birth, education, sex, religious and artistic influence, and what not. No chaos was this scientific freedom. It was subject to the law of cause and effect, the direct linking of one event upon another. Where chance seemed to operate, discovery was made of the *laws of chance*. The laws of chance have an uncanny certainty of their own. They are an excellent basis of prediction of the future from odds in games of chance to insurance statistics and astronomical events. Surely there is no freedom of the will, since it too operates in a mechanism consisting of atoms, hereditary traces, environmental influences and the like, subject to statistics. Yet it has never been *proved* that the ideas of mechanism are appli-

cable even to material things, not to speak of the psychical. The onslaught of BERGSON on the dogmatic position of the very materialistic biologists, resulted in a dispute as to the nature of evolution. Is evolution a mechanical phenomenon, or has it in itself unique elements of freedom? The concept of *creative* evolution admits freedom of a qualitative order in the progress of events. Many biologists have rallied to this idea under the banner of "emergence." What emerges in the formation of even a simple compound from two elements is something new, something not derivable from the addition of the properties of the two elements. The levels of emergence are many indeed. At a certain level a relatively free will may emerge. The only rein on a thoroughly independent free will seems to be that inexorable something, time. Besides, intuition is not a mere illusion. It is evidence as much as any evidence. Causal necessity is an external interpretation of events, which *internally* interpreted are free or purposeful. KANT was right. To know cause is to know that there is something not cause. HEGEL was right. In the last analysis, I suppose, the free will

position is just as impossible of proof as the other. Yet, it can be asserted. At the moment of conation and action there is a consciousness of a free will, or perhaps more correctly, of a free self. Experiment confirms it. There is evidence, in the best psychological work of the recent schools of an *immediately intuited* "self" having no causo-mechanical bonds. Why cannot that be as legitimate a starting point as an external bit of mechanism?

It all depends on the analogy one uses. If you compare the will to a magnet, you may argue that it will make a selection (of iron filings) but will not make a choice. As long as one sticks to mechanical or mathematical analogies, one arrives at mechanical and mathematical results. But are these the only kinds of analogy?

The mathematical analogy shows a curious difficulty, exposed cleverly by H. N. RUSSELL. He estimates that an equation for the human machine in terms of the motions of the molecules, if it could be written out, would occupy quite an area. If archangels could travel and read at the rate that light travels, 186,000 miles per second—it would take one

archangel 60 billion years to read the first line of the equation and another archangel 60 billion years to count the lines of the rest of the equation. This covers but one man, and is only the statement of the problem, and not the solution. Complexity is the bugaboo of the very strict determinist. For practical purposes, if not for the sake of a higher or subtler truth, he has to compromise with the freer, more qualitative points of view.

Mathematics and physics, however, have a consuming canker within. Their foundations are in themselves in the psychic life. I doubt whether any great living physicist considers his entities as real in the material sense. They are obviously theoretical creations and hopelessly indeterminate. The mathematician is hard put to it in the discussion of zero and infinity. I have often experimented with the mathematical application of the idea of "degree of freedom" to psychic phenomena. In physics and chemistry "degree of freedom" signifies the ways in which a material system may vary. A zero degree of freedom, perhaps, is barely intelligible as mech-

anism, but surely an *infinite* degree of freedom is not. The mathematical infinite degree of freedom can be equated to the psychological freedom of the will or of the self.

I should suggest the following problems for research:

(1) What mathematical and physical concepts are applicable to will without making it necessarily bound?

(2) How is will related to time?

(3) Where does quantity end and quality begin?

(4) What is it about will that makes us think it is ultimate?

The answers may run, I imagine, something like this:

(1) The will may have an infinite number of degrees of freedom. It partakes of the nature of energy. Some factor of it is a "vector," that is, it has direction.

(2) The will is time.

(3) Quantity is space; quality is time.

(4) The will is quality in relation to quantity. We say it is ultimate because we gain nothing by further discussion.

ART—FOR FREEDOM'S SAKE

"Nature is made better by no mean,
But Nature makes that mean; so, over that art
Which, you say, adds to Nature, is an art
That Nature makes."

I OPEN WITH gentle SHAKESPEARE'S reconcilation of art with nature. There are two natures and there are two arts. A grand comprehensive nature, a smaller comprehensible nature; a grand creative art, a smaller created art. One may, therefore, expect at least four opinions as to their relation. Here is the contradictory of the first defense:

Thus art is made better by no mean,
But some art makes that mean; so over nature
Which, you say, adds to all art, is nature
Which true art makes.

Had SHAKESPEARE lived more recently he might have written this opposing version. It is quite as much an answer to those who will insist on contrasting nature

and art, claiming that one or the other is of an inferior order of existence.

In a sense, however, it is idle to quarrel with the usage of language. Naïve as the distinction between art and nature may be, it is made. The encyclopoedia yields a very cautious characterization of art as "every regulated operation or dexterity by which organized beings pursue ends which they know beforehand, together with the rules and results of every such operation or dexterity." I think this definition excludes the winds and the tides, but may include the marvelous crystalline palaces of the Radiolarians if it should be shown that the Radiolarians in building these marvels knew their goal beforehand. The "unpremeditated art" of SHELLEY's skylark, I fear, would have to be relegated to a limbo which is neither art nor nature. I should also plant a little seed of doubt in posing the question: how premeditated is premeditated art?

Someone may object at this point that the description of art given in the statement of the authority may just as well fit, say, mechanical engineering or cooking or a bull fight. They are regulated opera-

tions, are indulged in by organized beings who know the ends they pursue, and may show rules as well as enjoyable results. Hard is the way of all definers! Unscramble art from nature, and you still have the task of dividing it from practical and theoretical science, from practical acts untainted by differential equations, and from mere idle play. It is hardly adequate to say that science consists in knowing, art in doing. It is but a slight gain to say with JOHN STUART MILL that science is indicative, art imperative. It may be a mistake even to separate them too sharply, because the actual world is far from being a dissected earthworm.

A more successful qualification comes from a similar source: "Fine art is everything which man does or makes in one way rather than another, freely and with premeditation, in order to express and arouse emotion, in obedience to laws of rhythmic movement or utterance or regulated design, and with results independent of direct utility and capable of affording to many permanent and disinterested delight." It is quite possible to recognize in this a summary of the leading characteristics of music,

painting, sculpture, poetry; with some hesitation, of architecture; and with still more hesitation, of dancing, of dramatic art, and the minor arts of weaving, jewelry and the like. At the same time, it seems to me that it may include a good portion of religion, science, and philosophy, for these too contain the disinterested, the delightful, and the emotionally elevating. If the reply should be made that fine art is present in these disciplines, but still remains fine art, I may be provoked into showing that these disciplines in their turn are necessary ingredients of fine art. And, to be sure, they are!

Precision in this matter, perhaps, may be attained by a seeming lack of precision. The microscope may not precede the telescope. A number of broad beams of description may determine by their intersection the bright nucleus of art.

I had asked how thoroughly the artist premeditated his art. Does he know precisely what he wants to express? Is the impulse to art the vision beautiful? The worshipful impression is that the revelation appears to the artist in full effulgence, and that he may not rest till he has embodied it in a suitable

material. The spirit is pure but the material is resistant. It baffles his sincerest efforts, and, even in the case of most transcendent genius, never quite expresses the ideal vision. The myth also springs up that, were it not for the difficulty in taming the physical material, many of us would be great artists by virtue of our musings, our imaginings and our day-dreams. It is a fiction as hard to believe as to disprove. Hypothetical artists abound who reason thus, but actual artists are closer to the reality. The fact is that they derive inspiration from their material as a provocative and a stimulant. They pause often to feel that. Even the Divine Artist has been alleged to sit back now and then to study his handiwork if but to declare that it is good. It is a sheer necessity that a human artist should do so. A work of art does not mature in a miraculous moment, nor is it conjurable by a pure act of the will. It is born, grows, develops, is often reborn, and, in all strictness, is actually *discovered* by the artist. There is no such thing as a finished imaginative experience without its material, whether that material consist of stone, colors, words or other symbols. What does

exist, however, is a state of fine frenzy, as it were, about the subject-matter. The personality of the artist is merged in the subject-matter to an extent but vaguely comprehended by the "normal" person. His agitation may be dismissed as something erratic, where really it is something overwhelming. When he corrects the faults which crop up in his work his impatience is not with his failure to execute a clear vision, but is a restless eagerness to build further on the discoveries made for him by the unfolding of the material.

Observe that the artist's passion concerning his work, and his constant discovery of his work, is as precise an analogy as one can hope to make with the work of a great scientist. Throughout is the latter an artist. He plans, flings his imagination into the unknown, makes the faltering first steps and discovers an infinite high road, as an artist. I submit that it is a delusion to see too much in one human activity and too little in another, because, on profounder examination, the two activities may be but one. There is a *true* way of conceiving the scientific activity as art, and the artistic activity as science,

provided the all-human emotional background of a mind in its attitude towards its subject-matter is taken at its primitive, eloquent value.

It is often asserted that science deals with the general, art with the particular, and that, hence, in spite of any parallels that may be drawn between the two, they must remain strikingly dissimlar in that respect. The simplicity of the distinction is provoking. Certainly there is no science with a capital "S" but of the general. Certainly the artist projects his creation into a particular form. But quite as certainly the artist builds toward his "general" on particulars. In fact the method of induction is a method of surveying particulars for deeper significance. In a very specific and *particular* experiment, as beautiful as any poem, the universal-tending truth and beauty of science shines forth. What else can be the aim and the achievement of an artist? Through the particular to the universal.

Objectors will continue: But how about methods? Does not science proceed by measurement, experiment, logic? True, but does not art proceed by measurement, experiment, and logic? Of course, it does.

Any claim to super-logic, for instance, that may be made for art by divine grace, is in the last analysis but a claim for better logic, as much needed in science as in art.

Have I not insisted too much on the similarities? What use would it be to identify art and science, even if it were possible to do so? I can see a great deal of use in their reunion. They may both grow to greater glory. As I see their differences, they are rooted basically in the temperamental choices of their adherents. There are scientific artists,—the calmer, more abtsract minds engrossed in art objects of a highly individual order, and there are the purely qualitative artists,—the socially human minds choosing concrete forms of wider appeal to the typical human beings at this stage of evolution. One thing is certain: there is no sharp dividing line between the artist and the scientist, between preoccupation with the general and with the particular, between the aesthetics of symbols of theory and the aesthetics of symbols projected into things.

Yet art must have a place in the sun. Is there not some way of weaning art away from the haunting

companionship of science, and, ultimately of religion, of philosophy, and of everything else? I think not. Consider the more extreme claims. Art is the creative act. Is science? The answer must come unhesitatingly that science is quite as creative. It is only a bit more hesitant and has a different code of values. If, in a statue, material and mind have fused somehow—is not this creative—have they not fused quite as well and as aesthetically in EINSTEIN's theory? If bronze is suitable material for a statue, tensors are suitable material for the subtleties of a four-dimensional world creation. Yet perhaps, after all, a difference may be discerned right there. Grant that both art and science are creative, yet insist that PHIDIAS made his statues beautiful without raising the question of true or false, but that EINSTEIN must seek confirmation in the stars. That is very plausible, yet I think a historic view of both PHIDIAS and EINSTEIN will reveal that first, both have sought the social approval of their creation; second, PHIDIAS was moved by practical, religious and symbolic motives rather than by pure aestheticism; and third, that EINSTEIN looks upon his work of art as pure assump-

tion which he only hopes will be applicable to the greatest art of all, nature. He also paints in order to see. The more I look into the mystic claims of art the more they seem to me to apply to science, or, at least, to science that the future is sure to bring.

Obstinate distinctions between vast categories of human activity are likely to cancel themselves. If they are not already cancelled, minds will arise which will fuse the seemingly irreconcilable into new syntheses, super-cancellations.

If fine art is too restricted a term to include science, possibly a wider term may. Such a term, perhaps, is aesthetics. Although it has been pretty well limited to the enjoyment of beauty in art and nature in a rather specific manner, it need not be. It may include the enjoyment of scientific and other pursuits as added modes. It should include the entire activity of the artist as well as of the critic and of the passive observer. It should comprehend active creation. Therein the term will have its full significance. Nevertheless, in spite of my eagerness to adapt the term to its wider use, I should have to concede that the aesthetic feeling has been limited to the con-

templative enjoyment of beauty, to pleasures free from cravings and anxiety, where desire and will are almost asleep. I claim this is an injustice to the term, but I may be heavily out-voted. But where is the term which will include the active element, not at all disinterested and full of conflict and craving that characterizes the true aesthetic energy? Have I, perhaps, suggested it in the words "aesthetic energy"?

The philosophers of aesthetics, art, and of the beautiful in general, are prone to construct most undemocratic standards for admission to the ranks of the recipients of the only and true revelation. Thereupon they are surprised to find few aesthetes. This, to them, is the result of the unpopular impracticality of art and of aesthetic refinement. It may just as well be the result of being too arbitrary in the definition of what shall constitute art. If we agree to call art or aesthetics only a certain mystic ecstasy, which some claim to have developed, there will clearly be but little of it. Even that little may be open to the impatient charge of decadence and perversion. It will not take, and its exponents' praise will be but a voice lost in the wilderness. Men of this

world simply will not allow themselves to be transported to another, and will insist obstinately that art, aesthetics, and the beautiful are indeed very much of this world.

TOLSTOY would and did object in a similar manner. To him exclusive art is bad art. The pursuit of beauty or an aesthetics of mere enjoyment are inadequate. Art is an activity which aims at the transmission of emotion. TOLSTOY would insist on the presence of an actual, and not a pretended, emotion, truly felt. Add to that the requirements that it shall appeal to a religious perception of the brotherhood of man, and must find a universal response, and you have an art quite different from that of the aesthetes. Is so violent a disagreement on the part of TOLSTOY to be brushed aside as an abnormality, or is it a return to sanity?

The prompt identification of the beautiful in nature has been taken for its separation. In nature, I say, it is inseparable. Precisely in art, where it is separable (or relative) it has not been consistently or at all unanimously identified. There is more schism in art than anywhere else. Taste, a product of dissection, is so varied, that in despair we repeat

"de gustibus non est disputandum" to close an endless discussion. The confusion about taste is but a tempest in a teapot compared to the confusion as to the delicate shadings of aesthetic appeal.

Turn to the simplest aesthetic feeling. By BOSANQUET it is described as something stable, relevant (concrete) and common. Its attitude is contemplative and such that feeling becomes "organized" or is embodied in form. In contrast with other feelings it has permanence. Its relevance is its tying up with an object or rather its appearance which is presented to us through perception or imagination. Its commonness lies in the fact that everyone recognizes the truly beautiful thing as beautiful, regardless of further interpretation. I do not think it difficult to make these observations rather uncertain. Responsible students have found that it is very difficult to establish a standard of beauty. It has not been clarified too well by critical analysis of philosophers, as we shall see. Nor has it been segregated as a consensus of opinion by experts. Nor has anybody taken the general vote of an art-enjoying mankind. In the case of the experts versus the people it has even been pro-

posed that two kinds of beauty be distinguished, easy beauty and difficult beauty. That is as perplexing a notion as any. What is easy for one may be inaccessible to another. What is dim at one time becomes vivid at another. I find that in an outburst of revolt against the artificial segregation of the beautiful experience from the rest of the personal reaction, an author like LETHABY claims for the simplest aesthetic feeling the following pot-pourri of ingredients,—a sense of (1) service, worth, desirability, (2) fitness for a particular purpose, (3) skill of the maker, (4) the economy of means to ends, concentration, intensity, (5) completeness, order, unity, magnitude, (6) insight into essential characteristics, (7) freshness, health, life, growth, movement, (8) sympathy with the mind of the maker, approval, wonder, (9) religious and patriotic values, (10) personal association, ownership, (11) reputation of artist, (12) relation of the work of art to historical development, (13) the scarcity of the work of art, its fashionableness, its strangeness, (14) the pleasure taken in form relations, rhythm and "lyricism," (15) luxury, sex attraction and perversion and even a sense of magic.

This outburst is more viciously analytical than the analysis it criticizes. I should say it proves its point, however, almost as a parody on the comedy of dissection. There is no particular gain in understanding in substituting fifteen factors for three, but there is a genuine warning that the aesthetic feeling, if one and simple, promptly and smoothly becomes the many and complex.

Aesthetics is a conglomerate of topics for numerous debates. Is it subjective or objective? Is it a science or not? If it is a science, is it not distinctly different from the others, say psychology or physiology? Is beauty a physical quality? Does beauty lie in form or expression? Can all kinds of beauty be considered as one? What is the difference between beauty and prettiness or gracefulness? What is the sublime, the ridiculous? Is aesthetic enjoyment social? Why do we not have arts of odors, flavors? How do play and aesthetic activity resemble one another? What is primitive aesthetics? What do the psychologists say? What is the use of the ugly? What are the goals of art? There is no common drift of opinion on any of these.

A brief historical survey will show that the COLUMBUS of the aesthetic world has not arrived, or that, if he has, many a bold sailor has lost his way trying to find him. The Greeks, who produced marvelous works of art, one would expect, could tell us a great deal about beauty. So would, perhaps, the equally creative mediaevalists. Yet, I believe, someone has shown rather clearly from the writings of those days that they did not conceive of art merely for art's sake. Hence, a convinced modern might say that they barely understood true art, true aestheticism. I think this attitude is at the basis of the distrust of SOCRATES' identification of the good with the true and the beautiful. It is a most satisfying combination and so harmonious that there can be no formula of deeper spiritual generality. Its crime is to be synthetic, and the analytical spirit draws us away. PLATO was an absolutist with regard to beauty as much as with regard to ideas, the eternal self-existing forms of which the real world is but a shadow. Yet SOCRATES' formula held. Art was mere imitation, but beauty was the essence of love and aspiration to the eternal (the ideas). Many have reproached PLATO

for the seeming rebuke to art. He more than made up for it by the elevation of his metaphysics. ARISTOTLE of the cool intellect is more analytical. The good is manifested in action, the beautiful may be present in motionless things as well. The beautiful is marked by the absence of lust or desire. The aim of art is not that of use. He announces that poetry is more philosophical than philosophy. Art is put on the plane of the symbolic. His predecessors discussed harmony, rhythm, order; he isolates order, symmetry, definiteness and a knack of choosing the right size, as aesthetic elements. His acute observations have really been the stimuli of the most modern preferences.

To PLOTINUS and the writers of the Middle Ages we owe the first ingestion of thoroughly mystic ideas. To PLOTINUS art is symbolic, beauty lies only in form. Symmetry and rhythm in the beautiful symbolize reason and divinity. There are three degrees of manifested beauty: (1) that in the real object, (2) that of the human soul, and (3) that of the human reason. It follows that the artist's notions may be superior to the beauty of natural objects. In line with his mystic philosophy there must be, of

course, an absolute beauty, the More-than-beautiful. The More-than-beautiful is the creative reason. To get the Christian point of view it is but necessary to add the typical insistence of AQUINAS that in beauty desire is quieted.

If SPINOZA had not ignored aesthetics he might have produced a paean to reason like PLOTINUS. And was it not like LEIBNITZ, who probed the depths as a creative mathematician, to say that "music is counting performed by the mind without knowing that it is counting" or, crisply, that "music is a felt relation of number"? Keen, paradoxical is this notion of qualitative quantity. Who will develop it further?

The name of VICO (1725) is being featured as that of the discoverer of the creative intuition. In spite of PLOTINUS. This concept centers about a moment of spiritual consciousness in which a man is brought face to face with reality without any intermediaries. It occurs before reflection, and is hence called intuitional. Creation is the expression of this special, luminous knowledge. This type of thinking is the ancestor of the philosophy of CROCE, which exercised a tremendous appeal lately,—the philosophy that

beauty lies not in judgment but in expression, and that its pure intuition is the most direct knowledge attained through simple awareness. I hasten to say that it is no more magical, in spite of the pretentiousness of the language used, than the really weird way in which we become conscious of any perception, the commonplace phenomena of cognition. We all accept the latter as obvious and unmystifying although it is in essence the enigma of the ages. To see and to see artistically are both unsolved problems to the practical understanding. A creative intuition is as possible as the direct simple vision of an object, as just merely seeing it and knowing that one is seeing.

To quote KANT, which is inevitable in philosophic reviews, aesthetics is the "scientific consideration of the judgment resting on the feelings of pleasure and pain arising from the harmony or want of harmony between the particulars of experience and the laws of understanding." The aesthetic exercise of judgment is an adaptation to the feelings of pain and pleasure. Beauty is, therefore, subjective. It is in the beholder. Yet KANT comments on the appearance of its own

purposiveness in a beautiful object as in Nature, to discover in it a kind of objectivity. Beauty is in a way, then, in the beheld as well as in the beholder. The judgments of beauty, however, are always limited to individual cases. At the same time there is a universal appeal. Platonic echoes are also found in his ranking nature above art, and in his inclusion of moral good as the highest significance of beauty. Philosophers like HUME and KANT are committed to placing beauty in the mind. KANT, however, is also an accurate external observer. He finds aesthetic enjoyment to be thoroughly social. He would not believe that ROBINSON CRUSOE, when alone, would find it necessary to adorn himself or his dwelling. Sympathetic vibrations are the meat of aesthetic enjoyment, yet he repeats the dogma that art and aesthetics are "ohne Interesse," without a particular bias.

To SCHELLING beauty is the revelation of the absolute. To him the subject and the object are clearly seen to be identical in the aesthetic. There is no use distinguishing them, and the artist does the inevitable in transforming an individual idea into an

eternal one. HEGEL speaks quite as authoritatively of the Absolute. Art is the first stage of the absolute spirit, and is the highest revelation of the beautiful. The beautiful is the ideal showing itself to sense or through a sensuous medium. The revelation, again, is immediate. SCHOPENHAUER adds to the absolutist point of view in contending that the contemplation of beauty is the nearest approach to the complete annihilation of the will. In that, we must remember lies his great hope of freedom. Again and again the aesthetic experience is pronounced to be purely mystical, the direct and immediate apprehension of an absolutely satisfying subject. This also foreshadows CROCE's deduction that there are no degrees of beauty.

The classifications of the arts follow the philosophies. HEGEL would place architecture in a symbolic group, in which the material preponderates over the spiritual; sculpture in a classical group in which the material is balanced with the spiritual; and painting, music, and poetry in a romantic group in which the spirit preponderates over matter. Historic eras follow these trends;—obscure ideas struggle in the symbolic

art of EGYPT, ASIA and MEDIAEVAL EUROPE; lucid self-possessed ideas govern the classical art of GREECE; vivid, adventurous ideas govern the modern ages. COMTE, who was busy with sequences from the simple to the complex, lists them: architecture, sculpture, painting, music, poetry. LOTZE, who stresses the idea of freedom, lists them: music, with no limitations and no practical end; architecture, with no limitations but with a practical end; and sculpture, painting, and poetry, more limited by their material. Each philosopher from his angle.

The Germans are far from being all of one kind of absolutists. It was HERBART who insisted that only relations please. Thus musical harmony exists *between* tones. As a "formalist" he finds beauty in a reduction to abstract relation, and must of necessity believe in a universal aesthetic judgment. He distinguishes the beautiful, however, from the useful and the pleasant which vary with the time, place, and person. The beautiful is, however, absolutely and involuntarily predicated by all who have reached the proper point of view. Still another absolutism! Indeed we have not yet seen the end of the

battle between the formalist and the expressionist.

The charm of LESSING may not be ignored. "Laocoön" remains a most interesting discussion of art by a great artist, who makes illuminating distinctions from practice. He has popularized "poetic truth,"—the truth of the artist, freely employing imagination on his own plane. A similar value attaches to the utterances of GOETHE and of SCHILLER. Says the latter: "Midway between the formidable kingdom of natural forces and the hallowed kingdom of moral laws, the impulse of aesthetic creation builds up a third kingdom unperceived, the gladsome kingdom of play and show, wherein it emancipates man from all compulsion alike of physical and moral forces." We meet here the theory that the fine arts are a form of play, the play of mankind. Between "Stofftrieb" and "Formtrieb" there is "Spieltrieb." This, it may be imagined, would please the anthropologists. SPENCER connected aesthetic development with play and attempted to trace therefrom a straight line of evolution. Yet, a modern scientist would find the origins of aesthetic to have been practical, seriously so. Make-believe comes only with the dying out of

the intensely practical, and remains as an emotional overflow. Yet perhaps, after all, the emotional is its own justification. Doesn't VAIHINGER *suggest* that the beautiful is altogether a self-preservative fiction of a human being, just, so to speak, to screw up his courage?

Intuitionalists and analysts know no national boundaries. COUSIN and LEVEQUE and RUSKIN agree that beauty is spiritual. RUSKIN's list of qualities of beauty is (1) infinity, or divine incomprehensibility, (2) unity, or divine comprehensiveness, (3) repose, or divine permanence, (4) symmetry, or divine justice, (5) purity, or divine energy, (6) moderation, or government by law. Contrast this with matter-of-fact analytical ideas, as BAIN's analysis, establishing that the aesthetic is based on (1) freedom from life-serving uses, (2) purity from disagreeableness and (3) the sympathetic and shareable nature of the beautiful. Too gray does this seem for the vivid spirits living in art!

Still the scientific spirit and the philosophic spirit must learn to cope with the ineffableness of art, for they too are not as restricted as has been rumored.

It would not be fair to accuse the psychologists of obscuring the problem. They are making efforts to find a method. Simple forms of aesthetic and artistic life do need examination and comparison. There is a need of primitive aesthetics, a need for study of taste in children and ordinary people, as well as in artists and in art critics. All opinions should be heard no matter how unscientific, for scientific contrast. The fashion of *experiment* was set by FECHNER, who certainly was no dry, over-rationalizing scientist. In spite of the relatively recent philosophy of CROCE, which tends to shut off experiment in the name of pure intuition, contradicting KANT in the doctrine that beauty is expression and not judgment, the scientific analysis goes on. Indeed even this is couched in vague terms, as when there is talk of an instinct of art, a definite impulse, an outgrowth of a very basic human trait of constructiveness. It is part of the necessity of psychology to treat of complex entities like instincts. Magic enough!

FECHNER led the physiologists. We have had workers like HELMHOLTZ and WUNDT who have probed the various aesthetic reactions of the *senses*

themselves. We have discussed "feeling-tone" in another chapter; we find its entry here again. A classification of psychological approaches is given by SULLY. The physiological is supplemented by the study of perception and of imagination in aesthetics. In the former, careful tests are made to discover how tones combine, fuse; what constitutes color harmony, symmetry, proportion, form and rhythm. An interesting matter too is the way in which aesthetic experience accumulates and acquires meaning. We are not born art critics. Difficult to follow are the ways in which parts make delicate wholes which transcend the parts!

The play of imagination is even more elusive. The association of mental states with shades of feeling is well known. We feel definite moods in nature. Are they really in nature? Why does a tomb look sad, why do pines whisper? Here we are in touch with the "vital" in art, its real magic. A psychologist like LIPPS singles this out as the outstanding *essential* of the appreciation of art. We read movement into forms. As my eye follows the line of a column it interprets the line as movement of the column. I am

the column. This transmutation has the German name of "Einfühlung" and the English manufactured equivalent "empathy." We may expect to hear much of Einfühlung or empathy. At least it has been named if not quite caught. Still to many it appears to be a "willing self-deception," an exaggeration of the element of illusion in aesthetic enjoyment.

The trick of empathy is a matter of "putting ourselves inside" of things. LIPPS, I believe, got his cue from LOTZE who discovers this "projection of our inner experience into the forms which we see and realize." Our own vital experience and agitation is transferred to the object. GROOS makes another psychological strike in describing an impulse in us to imitation, which is baptized as "inner mimicry." With their measuring instruments the scientists may hope to study rhythm as primarily the rhythm of the acts of perceiving, which is projected and transferred. In practice they may also try to show how empathy precedes sympathy, in which latter we become conscious of our part in interpretation. Of course, really and truly we do not leave our bodies at all to enter an external object. It is, therefore, our bodies that will

be tortured for the information. To quote VERNON LEE, an exponent of the experimental:—"We follow lines by muscular adjustments more considerable than those of the eye, and these muscular adjustments result in a sense of direction and velocity in ourselves and a consequent attribution of direction and velocity to the lines perceived." Much, then, will be made of bodily conditions, as in all modern experimental studies on feeling. The sublime will be coordinated, let us say, with a stretching upward and a standing "a-tiptoe," or a special inflating inspiration; the ridiculous in the spasms of laughter. How well, and with what meaning this may be done, one may be skeptical. More hope, perhaps, lies in other approaches, still scientific but broader. We have yet to hear the latest from the Gestalt and Ganzheit investigators. Aesthetic patterns? This species of analyst is the foe of dissecting analysis. They will remind us that wholes must be kept in mind. It is wholes that are enjoyed. And wholes are unique. The delight is in the blend. Apropos of what I feel is coming, I should also like to ask: Why separate the blending of formal and of spiritual values in art? Cannot a

scientific discussion go on without forced distinctions?

Besides measuring reactions and reflexes or the discussion of complex and unique wholes, roundabout ways are available. The study of art criticism, it is hoped, may serve to reveal factors of variability that may not be apparent to our bias. Opinions of children, savages, or lunatics will have to be weighed seriously for their significance of the relativity of taste. Art history will reveal variations and rhythms of human reaction to art and the beautiful. There may be cycles of taste. Is there not some subtle order behind the historic development? Consult the memoirs of artists, and draw conclusions, if possible. Experiment in art education, test the reactions of all types of people under the most varied conditions of aesthetic stimulation,—be an aesthetic behaviorist or an aesthetic psychoanalyst (with apologies and reservations), go to the ant and learn her aesthetic ways, and then see whether it were better you surrendered to sheer mysticism.

There is also a final possibility that in science itself, especially when applied to the study of beauty, lies

sheer mysticism. The impulse from nature, mystic nature, may become indistinguishable at its source from the impulse in the artist's mind. COLERIDGE knows this:

> "O lady, we receive but what we give
> And in our life alone does nature live."

I should suggest that all art constantly aspires toward the condition of nature, and that all science ultimately does the same. They may thus meet, the subjective and the objective, in the neutral source. For this reason I feel in sympathy with the open choice of a scientist of J. ARTHUR THOMSON's rank, of beauty as a *fundamental property* of at least organized or living matter. It is to be added to the list of the other properties of protoplasm. Is it not a packed jury which finds ugliness in nature, as in the hippopotamus, the jelly-fish or the snake? What is beauty? The innerness of nature, as it were. Not ease of perception, not even adaptation to an end, human or divine, not a form of recognition, but just seeing as in a mirror the beauty that is inherent, as any other fundamental is inherent. Art releases us from the

obligation of distinguishing reality and unreality, the true and the false, only in anticipation of what science itself may do when it will agree to postulate beauty as a fundamental property. There is a subtle relativity back of it all. Neither art nor science is limited, I insist, to a single logic nor to the chain of cause and effect, nor even to a single three-dimensional world. Infinities unfold from the matrix of mother nature. Who will say how many universes may emerge from the one?

I believe that it will be seen in due time that beauty is in the beholder, that beauty is in the beheld, and that beauty is in the beholding. If anything is subjective, the sense of beauty is. If anything is objective, the sense of beauty is. If anything is activity, the sense of beauty is. There is a constant birth and resynthesis of mind and matter, a continued re-creation of the ancient zero and of the present infinite. The deepest aesthetic experience is in this magic fusion.

THIS IS SCIENCE

THIS IS SCIENCE

A GERMAN WIT has characterized science as "exact nonsense." A very serious English critic has found in it only the "method of ignorance." TOLSTOY pretended that the scientist's work was merely to count the number of lady-bugs on this planet. These are a typical trio of criticisms to the death. They stab at a ghost of their own raising. Quite often worried souls have accused the devil of concocting the entire brew in order to decoy mankind either into automobilism or into madness. On the one hand science is blamed for the tyranny of the machine, on the other for its bewildering maze of subtleties and technicalities. What sarcasm has not been hurled against this newcomer, a newcomer that peers among the stars, explores the molecules, pursues the very channels of the brain, announcing laws of matter, energy, life?

Science can only profit by this hostility. In fact, it has more to fear from its eulogists. Many a rhapsody

has been sung to it, by non-scientists as a rule, that might throw a horror into a sincere antagonist. What a shout has gone up from many enthusiasts for the "miracles" of science! These do often turn out to be either automobiles or madness, neither of which the rooter apparently understands, but is impressed with. Another ecstatic notion is that somewhere in the maze of laboratory apparatus, where playful lightnings flash, somehow or other knowledge is synthesized. Sad indeed, would it be, if the great Brass Brain of the Geodetic Survey or the complex calculating machine at the MASSACHUSETTS INSTITUTE OF TECHNOLOGY were really the organs of knowledge, as one might infer. Still another group has pounced on a dogma that there are such things as unquestionable facts, and that only these count. Amongst a horde of enthusiasts for facts, there are, hence, extremists who would set up an inquisition, surpassing all we have had, who would brand as heresy anything speculative or expressive of the human will to conquer new fields for consciousness. Fortunately, knowledge is not to be split up in parti-

san ways, nor pessimistically, into "exact nonsense" and "inexact nonsense."

We may allow the scientists themselves to help us to define science. ARISTOTLE, speaking as one, called science art and stated that it "begins when, from a great number of experiences, one general idea is formed which will contain all similar cases." This thought has been strongly stressed by the lucid-minded French mathematician and physicist, HENRI POINCARÉ, who put it succinctly that "there is no science but that of the general." This disposes amply of the notion that a parade or census of lady-bugs is the scientist's especial concern. He may and does consider the lady-bugs as one particular illustration of some general relation joining them to other bugs, and on and on to other living forms, finally involving perhaps a relation to TOLSTOY himself. He seeks more than individual acquaintance. The particulars or the "facts" are not in themselves science, and were they to be left floating, or in little huddled clumps as they appear on the editorial page of a typical newspaper, they could never arrive at the status of science. Nor are there any such things as "scientific

facts" in themselves aside from their manner of gathering. There are facts that are used scientifically, that is, in construction of generalization. It is obvious, then, that to a sufficiently powerful generalizing intellect, all facts would be "scientific facts" and the most general knowledge would therefore shine in the most individual episode.

If such a mind exists or ever has existed, it has not troubled to reveal itself in mere flesh. To the most extraordinary as well as to ordinary mortals, experience, though not to be doubted as a reality, is quite elusive. But a few moments after an observation, if only on account of the passage of time, we lose our chief anchor of security which lies in the direct use of the senses. Time fades such truths. We are not as sure and become less and less sure of a fact as we travel away from it. Worse, we find that others going through the same sensations give widely differing reports, which they themselves change on repetition to an exasperating degree. The story of error is the longest story ever told. Unchallengeable facts are apparently almost mythical. When witnesses agree too well, it is excellent ground for suspecting col-

lusion. Indeed, we go so far as to estimate a person's culture by his awareness of the limitations of foolproof assertions of fact. It is this misfortune of the human make-up in observation that accounts for science's concern about facts, and why it is so meticulous in setting up standards of acceptability for scientific use. "Knowledge by acquaintance," as it has been called, is not science, but forms its starting point. It is only its unreliability that makes scientists devote so much time to observation, checking and rechecking, measuring and remeasuring almost to the point of nausea. Fact gathering and sifting is the first and most painful discipline of science.

Anything at all may be the subject matter, or, as some one has put it, the "object matter" for this fact gathering which precedes science proper. In our brief span of life, what then should one choose for observation? Imagine the predicament of an Adam thrust in full maturity upon a freshly created world. Would he not require a Paradise and several thousand years just to get a start? Yet we are in different circumstances. Luckily it may be that we have not been born in so untampered a state, but with a hoary

racial heritage of condensed experience. Our very organs, hands, feet, eyes, are expressions of this preliminary education. Our choice, hence, is almost decisively determined thereby. It has been hammered out, so to speak, by the facts themselves. There is a great deal in us that has been forced to follow the rules of the game for ages before we had begun to investigate what those rules are. Besides that, in historic time at least, we have had a heritage of the simpler generalizations, often quite erroneous yet always built about a germ of truth—that great body of opinion known as common sense. So important has this element been that a scientist like HUXLEY has defined science as "nothing but trained and organized common sense." TAIT, too, has called it a "common sense view of the world we live in." Apparently they were impressed that the common sense of yesterday has evolved into the science of today. This is not surprising. We still find, willy-nilly, that the world is a mass of repetitions, sunrises and sunsets, calm and storm, that the same elements are constantly turning up in the most varied combinations, and that it is just those things that are self-repeating

or repeatable that are interesting and fit subjects for study. Science, then, is not characterized by an exclusive subject matter, but merely follows some rules of choice forced by the very forms of experience.

More distinctly science is characterized by its methods—a set of procedures devised with a view toward accuracy, reproducibility and power of simplification. There has been developed a specific technique of observation most characteristic of scientists. Whereas the poet or artist places full reliance on his direct experience and allows his personal emotions to color them as they will in the name of a higher truth, the scientists also, in the name of presumably the same truth, operates in the opposite direction with the typical attitude of what he calls "eliminating the personal equation." This elimination of the self in order to guard against undue emotional bias is in itself an expression of the will, a strong desire to ensure the truth, to communize it. It has never been complete, it may be an impossibility in the extreme, but has always proven to be a wise and practical provision. Of course, the wary scientist knows well that he is there after all, and hence does his utmost

to allow for errors of perception and judgment. It is possible to reason about these mathematically, as one does in estimating chances in a wager. There are scarcely any quantitative investigations in which there is not much ado about the "probable error" or the "limits of accuracy" or the possibility of eliminating undetected errors by varying the experiment in as many independent ways as he can conceive. Thus, corrections for parallax in astronomy, which are simply corrections for shift in position of the observer, make all the difference in the prediction of an eclipse to the minute or getting it wrong by a hundred years. One may obtain the same results several times in succession, each time making the same mistake. A result is more certain if arrived at by different roads. A correction may need further correcting. The scientist's manner of seeing is marked, therefore, by the peculiarity of the distrust of his own senses. To him seeing is *not* believing, unless he has seen from every angle and has seen himself as seeing from only special angles. His must be composite vision.

Until he has attained this composite vision his atti-

tude is one of "suspension of judgment." This phrase is far from being a happy one because it is precisely his judgment that he uses. What is really meant is suspension of final judgment. He does, nay must, form tentative ideas. These are suppositions which the observations of facts will substantiate, or force a modification. They range from mere guesses to carefully developed logical conclusions. When they attain great dignity they are referred to as hypotheses. To avoid any unwarranted claims these are often referred to as "working hypotheses" that may lead to further search without themselves being infallible. The hope of verifying these cautious proposed generalizations draws one on from experiment to experiment, and from revision to revision. In the meantime, final judgment is suspended. The true scientist's mode of observation is, then, never final or dogmatic since he is ever striving to thwart his boisterous self and to prevent his mind from coming to a smug standstill. It is precisely when the notion spreads that some particular science has finished or has almost finished its task—as was the case with physics toward the end of the last century—that it is

suddenly revealed to be at the threshold of new discoveries that dwarf the previous ones, and cause a serious about-face not even suspected a short while previously.

Even after he has exercised all reasonable care in making observations, a typical son of science is but ready to start over again. That is downright exasperating. What now? Now he is after reproducibility. He is aiming at being sure that he would obtain the identical result again at any other time, and that any one else setting up the same conditions or finding himself in them, would make the same discovery. Scientific certainty prefers to tower from the four corners of the earth. Where conditions of observation can be prearranged, in other words "experiments" can be initiated at will, as in physics and chemistry, tests of reproducibility are nowadays a matter of routine. Where they are difficult, as in psychology, or a question of waiting, as in sociology, they are a matter of envy of the other sciences.

Let us suppose now that he has coralled a good live fact that will always run true to form. Even then it may be but a stalled horse. It must find its

place and function with other facts in some more general truth, or coherent body of verifiable knowledge, or a working hypothesis that will attract new facts and new points of view. At this point the scientist is bound to bring into play his entire logical equipment. He is ready to step up from knowledge "by acquaintance" to knowledge "by description" in ever-increasing scope. He must fit the facts to their kin, and announce relations that become apparent in the fitting. He employs inductive reasoning. Inductive reasoning is a term that may be applied to any activity of the mind that enables it to arrive at a general truth from a set of particular facts. The truths that are revealed by induction are necessarily colored by their origin, and are truths of description, truths of classification, truths of relation. In reality they never go beyond the facts. If properly derived, they cannot. There always hover about them the uncertainties inherent in the particulars from which they are derived. There's always the fear of omission of some unnoticed case. So firm an induction as "all men are mortal" may yet be controverted by one solitary case, a case beyond experi-

ment at that. Like all inductive generalization it gathers its strength from the conviction that is impressed on the human mind by the multiplication of instances and the failure of exceptions to turn up even when they are actively searched for. A master at inductive reasoning is ever on the alert to discover similar cases or analogies which he weighs on a scale of probabilities shading gradually into certainties. When ISAAC NEWTON induced the law of universal gravitation he most assuredly did not do so as the direct consequence of receiving a bump from an apple. He had spent long periods of time examining known facts about the motion of astronomical bodies, he weighed carefully the probabilities of rival explanations, pondered long and carefully over KEPPLER's laws, and finally tied it all together smoothly in the principle that any two material particles in the universe attract each other with a force directly proportional to their masses and inversely proportional to the square of the distance between them.

Obviously, this is far from being the ultimate goal of human knowledge, for one can stick a persistent

"why" on to any assertion or description of no matter what generality. Yet it is no mean achievement for it simplifies the "how" to a remarkable degree. Would that philosophy, religion, art could travel as securely in their search for the final "why"! The great scientists, being very human indeed and aware of the mysterious setting of whatever is, are content to credit science with but a modest aim. To several, such as KIRCHHOFF, MACH, etc., it is no more than "the complete and consistent description of the facts of experience in the simplest possible terms." To POYNTING: "A law of nature explains nothing—it has no governing power, it is but a descriptive formula which the careless have sometimes personified." To PEARSON: "The law of gravitation is a brief description of *how* every particle of matter in the universe is altering its motion with reference to every other particle. It does not tell *why* the earth describes a certain curve around the sun. It simply resumes, in a few brief words, the relationships observed among a vast range of phenomena. It economizes thought by stating in conceptual shorthand that routine of our perceptions which forms for us

the universe of gravitating matter." To MERZ: "A complete and simple description—admitting of calculation—is the aim of all exact science."

To others, essaying flights with Pegasus or bent on climbing Olympus, these scientists are content to say with indulgent sympathy and warm wishes for their success, quite as much as for their own. "This is Science."

THESE ARE THE SCIENCES

THESE ARE THE SCIENCES

TO ESTABLISH A who's who of the sciences is a difficult scientific task in itself. Most of them it seemed just simply grew up like lost waifs, and their origins and relationships are quite uncertain, and certainly undistinguished. Arising, as a rule, from practical arts, religious magic, and fairyland excursions, the older ones sprang into being and carried on somehow long before they were cultivated consciously. Astrology, alchemy, and nature stories grew wild and long. Science has had a long history, but a short past. There were no systematic gardeners to prune the early forms in their exuberance.

Something of this element of jungle growth was realized by FRANCIS BACON who declared that "the divisions of the sciences are not like different lines that meet in one angle, but rather like the branches of trees that join in one trunk." It was a wholesome realization. Nevertheless, he was not over-successful

in delineating those branches which persist in retaining their primeval snarl.*

* Bacon classified everything according to the artificial (to us) scheme of the 3 primary faculties of the mind, imagination, memory and reason. His scheme appears as follows:

I. Imagination—Poetry, by which he means the "fine arts."

II. Memory—History, of which there are:
1. Natural history
2. Civil history.

III. Reason—concerning *God*—theology
concerning *Nature*
1. physics
2. metaphysics
concerning *Man*
1. psychology
2. logic
3. ethics.

It may be an improvement on Aristotle's

I. To know— metaphysics
mathematics
physics.

II. To act— ethics
economics
politics.

III. To produce—poetry
rhetoric
dialectic

but in both we see how the older classifications fail to help us on account of their arbitrariness in division and lack of distinction between pure science and application.

AUGUST COMTE, at the beginning of the last century, made a grand sweep through the sciences, compressing them in a linear series of six fundamental sciences: mathematics, astronomy, physics, chemistry, biology and sociology; and a final supreme science, the science of morals. This series travels, more or less, so he claimed, from simplicity to complexity, from the abstract to the specific, and from the independent to the dependent. It may satisfy an aesthetic desire but it really gives us a highly artificial program for the advance of the sciences. Neither nature nor mankind, it seems, have worked in this fashion. Each science has its own evolution and does not evolve into another stage constituting a new science. Besides, in the family of the sciences many hybrids are of a constant occurrence, and there are odd members that are the despair of those that would establish species and genera amongst these all-too-human products of the intellect.

HERBERT SPENCER sails through Scylla and Charybdis with his typical skill at reconciling opposites. Having proposed as "abstract" sciences, logic and mathematics and as "concrete" sciences, astronomy,

geology, biology, psychology and sociology, he is forced to confess that it is all relative and but a matter of convenience by devising a group with the queer name of "abstract-concrete" sciences, namely, mechanics, physics, chemistry. And he thought COMTE silly!

Many good minds have made further fruitful suggestions. ALEXANDER BAIN suggested the distinction between *fundamental* sciences (Logic, Mathematics, Mechanics, Molecular Physics, Chemistry, Biology and Psychology) and *dependent* sciences (Mineralogy, Meteorology, Geography, Botany, Zoölogy, Philology and Sociology) and the rest he lumped as *practical* sciences. KARL PEARSON, maintaining the division of abstract and concrete, listed among the concrete sciences the physical and the biological sciences. He noted the occurrence of a cross link between the physical and biological, namely, biophysics. Another such link, he found, was applied mathematics. J. ARTHUR THOMSON has presented a useful point of view in distinguishing between physics and chemistry as concrete sciences of a purely *physical* order, and sociology, psychology and biology as of the

animate order. He considers the general sciences, then their special form (subsciences), then their combinations and finally their applications.

The author of this work has also made an effort at a choice that may combine as many advantages as possible. It seems to him that the historical origins of the sciences should prevent over-reliance on any scheme. On the whole it is rather fortunate that they are so tangled, for one of the crying needs of the day is to get away from over-specialization, and it is this factor that tends to bring the sciences together, just like the nature they set out to study. No logical division can do justice to so complex a whole as science, which is but a mirror to the most complex of all, nature in its totality.

There's hardly any error in combining in one group the sciences of method, or as they are often called the abstract sciences, namely, mathematics, logic and metaphysics. Those who are so constituted as to be blind on the metaphysical side, as many are on the mathematical or logical, will protest. But, let us beware of bigotry.

I should prefer to divide the remaining well-established principal sciences, namely, physics, chemistry, biology, psychology and sociology into two groups. I am convinced that it is the attitude of the science that determines its nature most distinctly. Hence I have placed physics, chemistry and biology into a group "the natural sciences" and psychology and sociology in a group "the human sciences." In the latter case the justification, the avowed aim of studying the *human being* as such, is distinctive. Were it not for that, they would perhaps be biology, and *because* of that they are not biology, nor are their peculiarities those of biology. Biology itself furthermore should be kept distinct from chemistry and physics in spite of some partisan enthusiasts who would have physics swallow all.

I have further followed the idea of combined sciences of which there are such as Bio-physics, Biochemistry, Physical Chemistry in the "natural" group, and Philology and Anthropology in the "human" group. I have also indicated some of the branch sciences of which the number is getting to be

legion, and elsewhere some of the applied sciences, of which the number is already legion.

My scheme follows:

I. The Abstract Sciences:
   1. Metaphysics—Critical science of reality.
   2. Logic—Science of thought and evidence.
   3. Mathematics—Science of quantity, magnitude, relation.

   Mathematical Logic—Symbolic union of logic and mathematics.

II. The Natural Sciences:
   1. Physics—The science of matter and energy and their relations.
   2. Chemistry—The science of the kinds of matter and their reaction.
   3. Biology—The science of living forms.

   Physical Chemistry—The links between physics and chemistry.

   Biochemistry—The link between biology and chemistry.

   Biophysics—The link between biology and physics.

   Geology—The study of evolution of the earth, based on the union of physics, chemistry and biology from an historical point of view.

III. The Human Sciences:
   1. Psychology—The science of individual experience.
   2. Sociology—The science of group experience.

Social Psychology—A consideration of the two sciences at once.

Anthropology—The study of the development of human types and arts.

Philology—The study of human intellectual development, particularly language.

There also exist combinations that bridge the major divisions. They are not absolutely distinct, and usually are hardly more than efforts in the more complex fields, thus:

Mathematical Physics—The formal mathematics of motion, energy and similar physical fundamentals.

Biometry—The statistical treatment (mathematical) of biological problems.

Psychophysics—An attempt at explaining mental phenomena by laws of physics.

Physiological Psychology—An attempt at explaining mental phenomena exclusively in biological terms.

The special or sub-sciences, are illustrable thus, to take chemistry and biology as examples:

Chemistry:

1. Inorganic Chemistry—Chemistry of all elements with exception of carbon.

2. Organic Chemistry—Chemistry of carbon compounds.

or 1. Analytical chemistry.
2. Synthetic chemistry.

or 1. Thermochemistry.
2. Photochemistry.
3. Electrochemistry, etc., etc.

Biology:

1. Zoölogy—Study of animals.
2. Botany—Study of plants.
3. Physiology—Study of habit and function.

or 1. Morphology—Study of structure and form.
2. Physiology—Study of dynamic relations, habit and function.
3. Genealogy—Study of development.
4. Aetiology—Study of factors in racial evolution.

There are as many classifications as there are viewpoints.

My table is the memory scheme that I recommend. It is not final, but I have found it very useful. Some such scheme is necessary for the appreciation of the unity of the subject, and, frankly, my aim is to convey to the reader my own sense of unity.

I am tempted to append the brief comments on the three groups of sciences that follow:

A CALENDAR OF

MATHEMATICS, LOGIC AND METAPHYSICS

The strangest thing about the mind is that it can contemplate itself, its own working and its own works. One can think about thinking. One can think about thought. One can think about the thinker. Therein we have an opportunity to found several sciences of the mind and of the mental, to wit, psychology, metaphysics, logic, mathematics, and possibly others. I single out for consideration as abstract sciences mathematics, logic and metaphysics, because in contrast to psychology, they presume to be sciences of thought *as such* rather than of the thinker or of the process of thinking. Metaphysics, defined as the science of being or reality, of course, has larger pretensions because it takes upon itself the ambitious task of summarizing all appearance, including the mind itself, as it presents itself to the mind. It can easily pass all bounds and become no science at all by passing into vague fancy; but, as long as it retains a kinship to logic of the sort that logic retains for mathematics, a science it is and a

science it will be. The scope or scientific nature of logic is hardly disputed. It may be most simply conceived as the science of inference. Every variety of inference. It deals with ironclad "laws of thought." To question it one has to be very, very brave indeed. Nevertheless it is subject to devastating criticism from the viewpoints of metaphysics and of psychology proper. It receives remarkable reinforcement from *mathematics,* long considered to be the science of magnitude and position, and yet in modern times closely identified with formal logic in a powerful deductive system under the name of "mathematical logic" or "symbolic logic." Every shaft of criticism directed at logic may well pierce mathematics too. The combat is such that metaphysics and psychology themselves suffer from the wounds they inflict.

The mental sciences really constitute an organic whole and are considered separately only because of convenience, or merely because in spite of our awareness of the unity we have not yet succeeded in organizing its expression. It shall be a shining white day for the intellectual world when even a partial fusion shall have been made.

THE NATURAL SCIENCES

The study of nature, if it be conceived as separate from the products of the mind, is that of externals. The term "nature" is used in this sense of outside things or events, with the mental reservation that in the end mental life too must acknowledge the parenthood of the mother of all. It is largely a matter of convenience that the natural sciences include *physics,* the science of the laws relating to matter, energy and motion; *chemistry,* the science of the constitution and transformation of matter; and *biology,* the science of the constitution and transformation of living matter both in space and in time. There is no cause for the implication that mathematics or logic are hence "unnatural" or are not even closely connected with the natural sciences. It is merely that their authority is largely internal, whereas the authority of the natural sciences proper is largely external.

The natural sciences, conceived in the above sense, are rooted in the world of things which we have learned to handle, shift about, eat. Our life is thor-

oughly entangled in these things, and the exercises of consciousness are largely those of the senses which are the avenues for the comprehension of these natural things. It was the senses that directed the divisions of physics along the natural lines of heat, sound, light, motion; the senses that determined the classification of chemistry; and the condensation of the experience of the senses that has characterized the peculiarities of biology. The evidence of the senses is their connecting bond.

THE HUMAN SCIENCES

The "human" interest is the determining factor in the foundation of a number of sciences. These are the sciences of man as man. We may consider man as a physical body, as a center of chemical reaction, and as a converter of biological energy, without even touching the very essence of man as man. That essence is found in his myriad-formed mental life. The key sciences of this group are psychology and sociology. *Psychology* is the science of the manifestations of mind in the individual; *sociology* is the science of the manifestations of mind in groups of individ-

uals. There are several human sciences which act as tributaries to these key sciences. The hardest to distinguish from sociology is *anthropology,* or the study of the history of man from the viewpoint of evolution. It may appear as a branch of *history* considered as a descriptive science of events of general significance. In practice anthropology limits itself to the study of primitive cultures and at the same time busies itself with physical and biological measurements with regard to race. The study of race character has, however, received the special names *ethnology* or *ethnography.* Furthermore, we have *archæology* which busies itself with the systematic discovery and interpretation of relics of the past, and *folklore* which may serve as a very sketchy science of tradition. A fascinating science that almost stands in a class by itself is *philology,* or the study of the evolution of language. It may be joined, however, in time by sciences of the evolution of religion, invention, art, ethics, which still reside in the bosom of anthropology. If it is not, it is because science is young and time is fleeting.

THE SIGNIFICANCE OF SCIENCE

THE SIGNIFICANCE OF SCIENCE

OUR BRIEF SURVEY of the sciences is successful if it has raised more questions than it has answered. For such is the nature of scientific progress itself. Every discovery carries with it an active fringe of novel suggestions and possibilities, which propagates into new discoveries. There is hardly any fear of science becoming dull through finality like certain theologies. Very little of it is more than provisionally settled, and most of it is being constantly upset. It is, however, growing in a striking manner and is adjusting itself to a greater and greater complexity.

In its growth there is an unmistakable organic element. The individual sciences, as it were, constitute a society in which there is coöperation as well as conflict. They interbreed constantly forming daughter sciences that partake of the characteristics of their parents and grandparents. Physical chemistry, biochemistry, biophysics, geology in the natural

science group; anthropology, philology, and education in the human group; mathematics and logic which seem to have fused in the abstract group; and then the further mixing of the strains in mathematical physics, biometry (applications of mathematical analysis to biological problems), psychophysics, biological psychology.

All these represent a striving for the unity of the sciences. It is held in check by the still too sluggish circulation among the sciences. The amount of special study that has become necessary to master the vast accumulation of facts in a single science is so great, that very little time is left to the specialist to study other sciences. At the same time the idea of co-operation amongst the sciences, not as to facts, but as to points of view, has not been presented as it should. There is a clannishness that makes a certain type of mathematician look upon a physicist or a chemist as a most inaccurate amateur. The physicist in turn looks upon the biologist as preoccupied with vague issues. The biologist of the same hard-boiled type may scorn the psychologist and sociologist who dare to introduce mental factors in order to get any-

where. Our survey has shown the futility of such undemocratic relations between the sciences. There is no aristocracy of scientific accuracy. It may seem quite an accomplishment of exactness to describe, for instance, in mathematical terms the multiplication of the numbers of a colony of bacteria in a certain length of time, yet it would be viciously inexact to leave out of consideration the distinctly biological elements of adaptation, purposiveness and evolution, that the same colony does show. It may well be that psychology may turn out to be of a distinctly higher order of accuracy than physics, and may even dictate to mathematics. If there were no other arguments for the unity of the sciences, there would be at least the one that they are all efforts at the intellectual reconstruction of the world, and that all these efforts are products of essentially the same human mind.

One may trace a circulation among the sciences. The three major groups are as three currents that approach, mingle and recede from one another, reminiscent of their common origin and most probably anticipating their common goal. In times of

distress the approach may become quite intimate. Psychology has gone through a period of severe distress for the relief of which it turned intensely to mathematics, physics, and finally to physiology. At times, it seemed, that a distinct science of psychology was doomed, that COMTE was right in making it a branch of biology. It shall, however, go on as a science in its own right, as the newer developments indicate. A similar crisis has arisen in physics. The contradictoriness of the phenomena of light has involved physicists in a re-examination not only of the fundamental concepts of physics but of all science. There is a general mystification that is felt may be solved by a closer analysis of the nature of sensation and even the nature of knowledge itself. The appeals are in turn to psychology, logic, metaphysics. Physics now points to discontinuities not unlike those of biology, as the appearance of mutations or sports. Physics is discovering an indeterminateness in things entirely foreign to the old rigid, fixed course of cause and effect. In that it begins to bear a strange resemblance to biology and psychology in their evolutionary points of view, and to their distrust of mere

mechanism. The currents have mingled. They will separate. They will join again.

Contributing toward the establishment of the unity of the sciences is the development of a field of thought, which may be referred to as the *philosophy of science*. It represents two large undertakings: one, the examination and establishment of the fundamental concepts of all science; two, the appraisal of the relation between the sciences, amongst themselves, and to other expressions of the human mind.

The characteristic thing about the fundamental concepts of science nowadays is their unorthodoxy. They are changing and they are expected to change. In the most enlightened circles there are no longer hopelessly contradictory theories. They have become differences in point of view. They bear a conventional nature, and are mental constructs that vary with the growth of our experience. If OLIVER LODGE picks as a fundamental trinity, uniformity, continuity and evolution, there are others ready to explain everything in precisely the opposite manner, as variability, discontinuity, and doubt as to the nature of time itself. Perhaps fundamentals should be men-

tioned in mutually contradictory pairs, leaving the ultimate decision to experience.

A popular attitude amongst the rank and file of scientific technicians has been to "take the cash and let the credit go," to confess ignorance of all ultimate theory and to just go about gathering experimental knowledge—the attitude of "positivism" so-called. But that works only with those who follow a beaten track. No frontiersman or COLUMBUS of science has ever proceeded without framing a philosophical or imaginative background which illuminated his progress. The great man makes a conscious hypothesis, the small man follows the great man's hypothesis unconsciously. The hypothesis is there nevertheless. One can readily observe that the growth of deliberate conscious scientific research in recent times has been accompanied by an extraordinary activity in the propounding of fundamental theories.

What is there to be found in the mine of fundamentals? The kind of philosopher whose name is "nominalist" would answer: "Words!" He would accuse the scientist of constructing a world entirely

in his mental image. But science works far better than a caprice of words. One need but look at the world to feel the whole attack refuted. The older philosophers of science, feeling this confidence quite thoroughly, chose as their first concern the nature of mathematical reasoning. From NEWTON to POINCARÉ we find comment on number, magnitude and the way we symbolize them. They are devices of our understanding. The next to come in for consideration is space. Geometric space is continuous, infinite, has three dimensions and is homogeneous. But is it the space we perceive? Is it really the space we are experimenting upon? And then time. Is that independent of space? A recent answer is, "No." The negative answers must be made comprehensible. What did EINSTEIN's predecessor, MINKOWSKI, mean when he said, "From this time on, space in itself and time in itself shall sink to shadows, and only a kind of union of the two shall retain independence"? Have we missed something? We must reinforce our faith in mathematics, space and time. What is force? What is matter? What is velocity? What is energy, electricity, light? Some will even

question, "What is causality?" And, then, what is purpose, life? The fundamental concepts of science are the changing answers that have been given to these questions in a tentative way. They are "leading ideas." How they have operated the reader might see even in the brief surveys we have given.

An attempt, too, has been made, but only an attempt, to reveal the blind as well as the conscious faiths or assumptions of the scientist. Such, for instance, as the principle of the uniformity of nature. Without it science would be impossible, because what occurred today might not occur tomorrow under precisely the same conditions. It is the firmest of all principles, yet we cannot prove it, because every experiment we might try would still assume the uniformity of nature. We would still be assuming that our eyes, measuring instruments, remain constant under the same conditions. The same seems to be the case with the principle that states that the world is rational, or adjusted. It is the principle of teleology, so thoroughly illustrated in the world of living things, namely, that things are adjusted to the realization of some adaptive purpose. This again,

can neither be proved nor disproved till both science and life are at an end. A third principle is one that would state the actuality of the external world. Science is constantly speaking of objects as though they had a more or less independent existence of their own. Other principles are the assertions that space and time are actual. Students of philosophy will recognize that these principles also, which have worked so well, nevertheless are not to be proved nor are they to be disproved. The situation is merely this:—We can do so much with them and so little without them.

Practically the same considerations apply to certain rules of guidance in science. They are not demonstrable, but recommend themselves strongly in practice. Such a rule is the famous OCCAM's razor: *"Entia non sunt multiplicanda praeter necessitatem."* Theoretical existences are not to be increased without necessity. It is a warning against the invention of new causes and explanations as long as old ones may be made to do. It is very often referred to as the law of parsimony. Its insistence on simplicity is razor-like. Many have questioned this affection for the

simple, but it is to be feared their very questioning has been for the sake of simplifying. It is in conformity with this principle that many have hesitated long to accept the presence of a special vital force in living things, not being convinced of the necessity of such an entity, or that no other explanation could be found without it. It is in obedience to this rule that physicists dropped an unnecessary cause in centrifugal force, which, therefore, is no longer an actual existence for them; later the "ether" and recently the force of gravitation itself as subservient to a more inclusive mental construction, "the field." Neglect in applying the razor, leads to wholesale turning of abstractions into existences. Of such a nature has been the habit of the Ancients in conceiving rather material gods, as Vesta for fire or Janus for new enterprises like the new year, and of the Moderns in taking abstractions to be efficient agencies, as "nature," "evolution," "gravitation" and in brandishing them as the Ancients did their gods. In the same breath, however, we must mention the opposite form of fallacy, the fallacy of simplification, whereby very often a complete and rather satisfying mechanical

explanation is imagined to account fully for a phenomenon. There are factors, such as value, obviously applicable to living systems, that are likely to be overlooked in an exaggerated faith in simplicity at any cost.

The examination of the philosophical foundations of science will lead us from fundamental concepts to critical discussions of the methods, points of view and arrangements of the sciences. In this spirit we have received the classification of the sciences at the outset as a guide to our treatment. What remains is to philosophize about science as a whole, set in the midst of a mixed world of friend and foe.

Many questions claim an answer whether one can readily be given or not. How can one be assured that science is a good or an evil? Yet we must assume one or the other. If we are uncertain and tolerate it, we really act as if it were a good. If we are convinced of its evil nature, we pass anti-evolution laws or worse. To a savage science is neither good nor evil, because it is non-existent. To a civilized Westerner it is a forced option to evaluate it. In criticism, of course, he will mix good and evil, he

will praise and deplore in the same breath, but in tolerating it he will betray at least the hope that it may be pleasing in the eye of God. Such a hope is probably the driving force behind the devotion of a vast army of men to scientific pursuits. The greater the scientist the less the unquestioning certainty and the greater the poignant hope that the sacrifice shall not have been in vain. There is a type of jingo among the petty technicians of science and lay admirers of inventors that refuses to see any flaw in the science of today. This is plainly due to little knowledge of the agonizing limitations of science, and even less comprehension of the unescapable mystery and subtlety of human and cosmic existence, a mystery and beauty remarkably revealed by the deeper reaches of science itself. The guides to be followed in the proper evaluation of science are those who have traveled farthest: FRANCIS BACON, ISAAC NEWTON, LEIBNITZ, DARWIN, EINSTEIN. What reverence and human pathos there is in their approval of science!

To approve one must understand science in its environment. How is it related to art? to religion? to philosophy? to anything else? Is it really restricted

now and forever? Wisdom teaches us to answer cautiously. So often have predictions been wrong that one feels a fear that they must be wrong. Especially is this true of cocksure assertions. They seem to be fated for the most smashing refutations. A noted philosopher took it upon himself to announce in no uncertain manner that we shall never know what the heavenly bodies are made of because we could not possibily ever get up there. Whereupon BUNSEN shortly afterward succeeded in analyzing the light of the sun, moon, and stars, and proved quite conclusively that they are made up of precisely the same elements as the earth. It took one short year to convert the impossible into something rather well established.

To delimit the field of science also requires a confidence which rushes in where it had better fear to tread. Granted that the successes of the scientific method are incomplete and uneven, it is by no means obvious that there are regions here and there where it cannot be admitted at all. It is poor logic (fallacy of enumeration) to argue from the fact that there are regions as yet untouched by science to the gen-

eralization that it will never touch them. It were saner, as some have done, to claim that the scientific method is a delusion altogether and is not really applicable anywhere, that it is the method of ignorance, that it is highly artificial and picks only the superficial facts and is therefore always wrong, question-begging, and unsatisfying to the critic within us that knows intuitively what real knowledge is. Words are sufficiently flexible to enable clever writers of the type of EDWARD CARPENTER to prove all reliance on other words, the words of science, to be a chimera. Unfortunately it is by logic that they attempt to prove the futility of logic. It is, therefore, fatal for them to win their own argument. Phoenix-like systematic thinking based on evidence rises from the ashes of its own funeral pyre. To admit science to some fields and to exclude it from others does not simplify matters, because it involves the same debate about the excluded portions that a blanket excommunication would. What seems to be left is the possibility of admitting science to all fields without imagining that it exhausts them. That there is a lack, the lack that art and religion and philosophy may

fill, may be felt rather than reasoned about. Most of us feel it. There is no telling, however, whether the void can or cannot ever be filled by advances in scientific method of such a nature as to include the phenomena we are accustomed to describe as intuitive. In the present state of our development, a moderate point of view would be to hold that no field is science's own nor is any field, being an object of thought, totally separable from it. There is no royal preserve for knowledge, emotion or mystic insight.

The relation of science to art is a source of good-humored banter. The artist's reaction to the scientist is based on a truly odd assumption that *emotion* plays no rôle in the scientist's life. Rather it plays a different rôle. Not only can it not be totally absent where a human being is involved, but it *must* be definitely present to make a man a true scientist. The satisfaction of something so basic as *curiosity*—an instinct, if there ever were one—must have a large emotional content. When properly fed it becomes the "sense of wonder" which is almost indistinguishable in the scientist and in the artist. The identity of the two is apparent most clearly in the outstanding but

not unusual case of GOETHE, who combined poetry with science. The well-spring for action in such natures is the same for all their activities, and it seems to water many soils. The great scientists are invariably poets who write in a language of their own. If the Heavens declare the glory of the Lord, so may the remarkable discovery and formula of adrenalin.

The aesthetic satisfaction one derives from the emotions that lead one into science is equalled by the aesthetic satisfaction from the beauty of the results. Mathematicians and astronomers are particularly blessed with the revelation of great harmonies. "Elegance" is a distinct requisite of mathematical proof. *Symmetry* and *rhythm* figure prominently in the artistry of science. The greatest of the aesthetic values, however, is the *universality* that is present in each individual phenomenon. The breadth of eternity proceeds as well from great science as from great art. The restraint of the scientific temperament is not to be interpreted as a total lack of it, and the abstract beauty of the results of science, as a total departure from the beauty of the concrete world of sound and color. Art and science are united by the

clairvoyance behind them. Clairvoyance, or, if you will, imagination or the recognition of a significance just beyond final grasp.

If we turn to religion the analogies are quite the same as in the case of art. If we mean by religion no institutionalized form of worship, but the source of that instinct which has led the founders of religions to worship, we again come face to face with the basic "sense of wonder," with the aesthetic need of harmony and law, and its own peculiar need of out-pouring in prayer. But why cannot both art and science be looked upon as the prayers of a most comprehensive religion, the religion of mysticism? If, however, religion is taken as a species of traffic with good and evil spirits, a matter of striking bargains with regard to prosperity, reward or personal safety, or as the last word in its books on the physical, chemical and biological constitution of the world, it becomes involved in a morass of mal-observation, primitive speculation and sheer superstition. It is then in distinct opposition to science, and not only to science, but to art, philosophy, and the true religious essence as well. The irreligiosity of much that passes for

religion is paralleled, of course, to quite an extent by the unscientific nature of a great deal that passes for science. The rôles are quite often interchanged. Acts of faith—such as belief in the uniformity of nature, belief in the postulates of our minds—are the fountain heads of science, rather than of religion. There is great difficulty, however, in specifying a different or a contradictory faith for religion. There are, indeed, distinctions between faith and credulity, of which the latter very often is relegated to the superstitions which live like barnacles on religion. Yet in science there is scientific credulity too—as belief in the actual existence of the theoretical names of science, as electrons, ether, gravitational forces. But faith in the ultimate for both science and religion is the unescapable minimum of belief that comes with consciousness itself. All else is theory, and from there all roads may diverge. The roads, however, may cross again and again, as when ethical motives tinge scientific advance, and scientific procedures are appealed to in support of theological thought. One often wonders where the truer prayer occurs, before a shrine

or before a magnificent illumination of the human intellect?

This brings us to the kinship of science and philosophy. It is the kinship of speculation with the objects of speculation. One provokes the other. We find this realized in the epigrams—"philosophy is the handmaid of the sciences," "the sciences are the handmaids of philosophy," "philosophy is the science of the sciences." Philosophy occupies the unexplored field at and beyond the outposts of science. The guess imaginative is often a necessity of science. That is the same as the guess philosophical.

We have already seen the service of critical philosophy for science. It serves as a corrective of false fundamentals, observing from a larger point of view the implications and meaning of scientific concepts. Formerly the professional philosophers raised objection now and then, but now the scientists themselves are developing philosophy. Formerly philosophers borrowed bits of scientific knowledge for their purposes, now it is being offered wholesale. On its critical side philosophy has well become "the science of the sciences."

There is, however, a large field of philosophy that is essentially speculative, not critical. A freer spirit is liberated there. There the scientist, who, as scientist, must suspend judgment and declare himself ignorant of the solution of many an unsolved problem of science, is invited to gambol and disport himself to his heart's content. Since he is a human being and a very curious one at that, he *will* form some imaginative scheme of existence, even if he knows that not only the proof but even the possibility of a proof of his speculation is far distant. Yet the dreams of one age have a way of becoming the realities of another. And so, if experience is a guide, no doubt some of the speculative philosophy of today may break ground for the science of tomorrow, being fed, as it is, by the science of today.

A similar co-operative "symbiosis" exists between science and its applications to the practical life. Who is not aware today of the inventions that have been made possible, not by little accretions among themselves, but by the discovery of new principles? It is true that a search for a principle may be initiated by a practical desire. A gap in theory is often revealed by

a practical problem refusing to allow itself to be solved by an old theory. But it is theory, in the last analysis, theory or a prevision of some sort that is necessary as a justification in the mind of the inventor, before he tries to turn it to practical account. The economics of invention points steady toward the encouragement of theoretical research. The theory is the full moon that illuminates many roads, some brightly, some dimly. It may take an age of special invention to trace the roads revealed by one moon. Will not better illumination from above reveal more and better roads?

It is tempting to say something about the future of science. Whatever it will be, it will not be exactly like the past. History may repeat itself, but there is always, nevertheless, some new phase. The novel element in the progress of science is that it is becoming more critical and self-conscious. If we are to trust the analogy of the growth of science with that of an individual, we are at the end of a period of adolescence. Science is reaching young manhood. We can, therefore, expect developments, both in theory and in practice, that will reveal the results of

some degree of maturity. One might await with particular interest the development of biology in the seemingly opposed directions of physical determinism and psychological freedom. This would be but one of the issues in the compelling desire of unification. Success may in itself serve to reveal new universes to conquer, and greater unifications to achieve. The future of science reflects the future of life itself—an unending adventure in revelation.

A PRACTICAL WORLD

A PRACTICAL WORLD

A MATTER OF unanimity among philosophers has been the intimate contact between the scientific and the practical. The agreement has been rather one of tacit assumption. It was only the determined attack on the authority of the intellect even in the mere matter of scientific knowledge that has served to reveal a possible doubt as to the identity of the scientific with the practical. The intellect is an instrument of the practical. Science, if it follows the intellect, is then truly a servant of the practical, but should it adopt non-intellectual means, it may then well escape the taint of the practical. An intuitive science need not be practical. A metaphysical science need not be practical. A science-in-itself would be beyond all practical issue as thoroughly as a thing in-itself is beyond the phenomenal world.

It is obvious that so thoroughgoing an unpractical science has not arrived. This is no reason for as-

suming that it cannot be or that it even cannot come soon. It merely makes it a hope for some or a possible doom to others. Our present-day science, in spite of the relativity theory, quantum mechanics, and cosmic rays, is preëminently practical, and practical in a narrow sense at that. Leading scientists find it necessary to act as apologists for the absence of immediate practical results in the more abstruse reaches. The fruits are promised later. The real philosophical issue between science and possibly some deeper form of knowledge is not raised at all. The aesthetic and the ethical are not ignored to be sure, but they are either converted into pseudo-sciences, or are set apart with religion, an attitude of mind befitting the Sabbath when the practical life is at a low ebb, or when the Trustees and the Faculty join in the contemplation of a make-believe world.

It is a definite article of faith of every civilized community that it is to science that credit is due for the myriad of conveniences and devices that constitute the daily round, the morning exercises, the diet, the implements of business, the automotive rushing about, the long-distance speech, the floods of

matter and energy, the manufactured world of amusement and the organic chemical sedatives to lure sleep. The practical world, for better or for worse, has learnt to ignore its earlier nurses for the guidanceship of science. The choice is a living option with each one of us. Not only is this the case with individuals, but also with the community, yea the whole wide world. The option of science, to use the terminology of WILLIAM JAMES, is of the genuine type. It is forced, living and momentous. The choice *must* be made and it is being made. Nor is it to be inferred from my own somewhat disappointed tone that to the typical son of the day it is an issue of efficiency versus morals, or of automobilism versus spirituality, but it is rather the spirit of scientific service versus unintelligent laissez-faire, indeed the conscious against the semi-conscious.

May it not be for the better, though apparently somewhat shallow, that the trend of the age is brazenly scientific, research inspired? The adolescent world of RENAN is merely elbowing forward, reminiscent of its childhood, yearning for manhood, and learning agitatedly, in its transition, the rudiments

of a future introspection. Never before has the world been so scrupulously studied; for are we not gathering knowledge for some great, surprising leap, and have we not learned this hope and belief from fair Science itself? And if man has not yet grasped the vision, is there not already so widespread a ferment that it will stir the mass in time? The scientific education of the world has begun!

In the present period of reconstruction, then, science is bound to assert itself, if not from without, at least as a leaven from within. It is my purpose to credit this tendency to the full and to estimate the situation as it may be observed from the viewpoint of science in a probable program under the head of Science and Reconstruction.

The trends of science itself require some examination before any definite rôle may be assigned to it in the world's work. I repeat that the nature of science is puzzling. To the dismay of our wonted logic, the well-established order which impressionable outsiders see, the eternal stability which routine minds in the ranks insist upon, are but telescopic in their

reality. Look closer, and science itself is not truly classified.

Yet it is not the mere classification of the sciences that I mean, although that too has baffled many a sincere philosopher, but a clarity as to its evolution. The current classifications apparently need at least a decennial revision. Surely there is a growth the laws of which have not been thoroughly grasped. One can only speak of trends or pathways in this tangled forest.

There are three highroads which may be called science. First there is the secretive science of application. Numerous laboratories and shops send their sharp eyes to read and reread the same multitudes of scientific and technical reports in different ways. There is much ado like unto cooking and baking and behold there are new products, and in these States sooner or later a million and three quarters of patents. The story of the myriad ideas back of this inventive jungle has not yet been told adequately. Then there are the producers of "pure science" and their products compressed in painstaking, unenthusiastically prim reports,—Annals, Annalen, Archiv,

Journal, Receuil, Comptes rendus, Transactions and Centralblatt. The university and now and then an ambitiously altruistic commercial laboratory, or a not unwealthy experimenter, are the supporters of these records of a civilization. And finally there is a third pathway, thin and glittering,—philosophical science. It is the brillant achievement of but a handful of heroes. Metaphysics, reality, values, the search for fundamentals, the formulation of aims, are their interest. They have scarcely formed a school as yet, but guardians of science are they. "Pure science" is but the *application* of their ideals, and "applied science" only a further application. Or we might say, pure science is thus flanked by pure thought and by pure action.

These activities are the three which determine the place of science in our civilization, and on their development and grandeur depends the value of science in the reconstruction, or construction, of a practical world.

We may essay a glimpse of science in the workshops. Analysis of the industries shows that even with the advent of the Taylor efficiency systems and

all the righteous correctives that have been applied to its crudities, only a beginning of practical order has been made. The chaotic conditions, engendered by an age of hectic development, of unheard of construction off guard against destruction, of intensive preoccupation in the pursuit of the main chance, have by no means disappeared. Its symbol is that of many a factory that looks like a badly dissected earthworm. The present-day city of technical science has been built most curiously around the cowpaths of industry and awaits clearing and rebuilding.

Quantity was the first care of the efficiency expert. It still is, I am afraid. Notably, one might observe, in the clothing industry the age has spurned the thrifty "A stitch in time saves nine." A realization must come, of course, that the frequency of changes in clothing is becoming uncomfortably high, like that of the Tsar who was supposed to put on a new shirt every minute. All this applies to clothing in the wider sense. What reason is there, on the other hand, not to make paper-filled shoes when the standard of respectability requires that a change must be made every three months? Straw hats are seasonal. Hence

they are what they are. No wonder at all, in view of the style-stampeding of millions, that even scientific production is strictly trade-determined and not strictly industrial. Slaves have made efficiency subservient.

Scientifically, the question of quality should not be more difficult than that of quantity. Our exact physical sciences fundamentally deal with groups of qualities. Complications, however, exist in very strange forms indeed. In the chemical industries there are products which, if 100% pure, will bankrupt the manufacturer, while say a 92% product, as in the case of benzaldehyde, discolored and adulterated to the popular shade, will enrich him to the delight of income tax provocateurs. No, the figures are not reversed. In many cases it is a difficult scientific problem—because it is unscientific—to maintain a constant degree of impurity to please the all-intelligent trader and his public. Apparently the invasion of true quality in many quarters is incomplete, in spite of the advance in technology.

Does this hold true in the stamping ground of the engineer, the power industries, the industries of the

steam engine, the gas engine, the water-turbines, the electric motor? To quite an extent, yes. Although the PV diagram and the horse-power formula and entropy charts are much in evidence, there are weird coal contracts that nullify the combined wisdom of WATT, FARADAY and CARNOT. Then the smaller choices of power are romantically haphazard. We are quite familiar with the not uncommon plunging of the investor in a 100 horse-power boiler when a 5 horse-power one may do. The point is that science is oft under a mysterious censorship, even an implacable, intolerant control which does not stop at suicide.

We note, then, often an unworthy subservience of industrial science, in spirit, to prevailing fashion, an incomplete invasion in other quarters resulting in a nefarious half-breed science, a trafficking in business alchemy, and, worst of all, a misuse for "wiser" ends, or scornful repudiation. The first fact, however, is the only one that can be employed as a charge against science or science's code of ethics. But it is right there that the optimistic note should be sounded. It is a remediable fault, the remedy being produced by extreme social distress in disobeying the proper ethical

implications of a true technology, including social stability as one of its factors of safety. Need I cite the recent catastrophe as the warning of warnings that science to be more scientific must henceforward be critical also of men and customs? There is *ethical efficiency* as well as mechanical efficiency, and economic efficiency.

That the larger view need not be foreign to technology we may see from the consideration of the vast tributaries of endeavor that flow into it. Specifically, we see it in the development of ways and communications, the generation and use of power, the transformation and shifting of matter, and the progressive partnership of invention and improvement. The practical as a social totality, unique in its concretion and "Ganzheit"!

It is a truism to state that the social order is intimately bound up with the development of means of communication and transportation. Yet this very obvious truth has not been developed into an extensive conscious program. Its goal has not been achieved merely in the 20th Century Limited or even in a radio telephone conversation with England.

There are many other kinds of bridges to be built across the Atlantic.

We may send on our ideas, ourselves, or our goods. But wireless telephony will accomplish as little as a slow mail, if certain types of censorship prevail. Science, to vindicate itself, must become the force to beat intolerance. Will it organize to transmit *intelligence* as well as stock quotations and rush orders?

Will it organize to move our very selves about to improve the quality of our rational thinking? Organized travel for large groups is a problem for an enlightened technology. Besides, coming "home" will bring new values into the home. I make these suggestions not to favor movement for movement's sake, but movement for improvements sake. Otherwise we move about excessively, because aimlessly; we work in boxes, sleep in boxes, travel overmuch in boxes, and when we die, are put away in boxes. I plead for freer, not boxed-in, traveling. May not science cure a nervous nation by a world-airing?

Of equal importance for the stay-at-homes is the science-in-swaddling-cloths of town planning. This

will be much involved in the economizing of locomotion. Life in our cities is so much ado about nothing largely on account of useless rounds. Half the time of an entire population may be saved by proper arrangement of centers for work, play, and domestic bliss. There is room also for a technical science of railroad economy, modified by aerial economy and electrical distribution. Who will develop a national, if not a world program or system, for the efficiency of the ant-heap? As things stand, however, the token of salvation for the paterfamilias is still only the makeshift of the patient Ford.

If we do not shower all blessings on the Sunday pleasure (?) car, we might do better with cattle or freight. But do we? When will there be an adequate program for such improved transportation, and the actual rearrangement of industries for shorter hauls? Rearrangement of industries is in many cases commercially feasible. It would pay not only to follow scientific principles in locating new plants, but to relocate quite a few of the old, especially where an industry has become rooted merely traditionally. I had puzzled over the centering of the old-time beer

industry in Milwaukee. It had no better technical reason than any other transfer of German institutions, including the trend to a beery kind of Socialism. We need badly a Congress of Strategy for the location of industries. Some of its subcommittees may work out charts of labor distribution according to quantity and quality, raw materials, power markets, transportation factors. May they not reveal also the *legal* oddities that make the State of New Jersey a petroleum refining center, necessitating pipe lines halfway across the continent? May they not discover a possibility of pipe lines for acids, alkalies, salts, dyes, chemical gases, disinfectants, and even liquid foods? One can go on indefinitely piling potentiality upon potentiality.

The industrial study of *movement* is vital to civilization. A problem of problems it is to equip the world with the best circulation system. It is of paramount importance to the *health* of the world.

A few words about the energy-power situation will reveal similar vistas. Where is, for instance, the master dissertation on coal, turf, peat, shale, oil, alcohol, benzol, which will give us their full signifi-

cance as energy, active and potential? Especially nature's diffused sources of energy—the sun's heat and the earth's water-falls have not been sufficiently estimated for man's industrial uses. The radiation constant, true, is known, and suggests, on the theory that all energy originates from the sun, a fabulous maximum. Why so helpless, O world of inventors? At least the accountants might attempt a science of *national power accounting.*

The chief problem, however, aside from accurate accounting is the transmission and distribution of power. Even if we know how many kilojoules of energy is equal to a suit of clothes, we are much more earnestly interested in where and how to get the power that will make the clothes.

A universal system of transmission would settle the preliminary difficulties. Electrical transmission is wasteful and waits on the invention of a direct current transformer. The alternating surges that are now used are much more limited in range. May I suggest a national day of prayer for the genius who will produce the long-range direct current transformer? Three other measures I should urge more

seriously, an Energy Institute, an Energy Prize, and Energy Conventions.

What holds true of energy generally holds true of matter. In fact the chemists will tell that "matter always has a certain amount of energy associated with it," and that chemical transformations of matter are essentially energy changes. In grosser terms, I should say that no true quantitative index of resources exists. Wherein lies the industrial meaning of a certain amount of matter? One thousand pounds of platinum will mean nothing unless translated into chemical utility, or, alas, jewelry. It may mean two complete 100 ton plants for the concentration of sulphuric acid, or it may be food for a despairing Midas.

Food, clothing, shelter and tools are the implacable subject matter of the epic of economic life. All industries, we must not forget, terminate in such ends. Their organization is still weakly scientific, their distribution is hampered by poor circulation and varied forms of sabotage, and their utilization is haphazard. The primary scientific task, already realized, would be to establish a satisfactory matter and en-

ergy budget for the community,—not that production and consumption statistics are inaccurate, but that they are uncritical. Nothing short of large, socially inspired technological councils of men from all walks of life will achieve the goal aimed at.

Admirable as far as they go are the statistics, for instance, of the Bureau of Mines on petroleum. The details of utilization are given and, the distribution practically on any day is known. These matters are studied by monthly charts. Too few indeed are they. An extension and an intensification of such studies is imperative. Not only the plant itself but equipment and process development must receive the same scrutiny. Special care should be devoted to working conditions and the question of technological education —all that on a grand scientific scale, involving the engineering and sociological forces of the country in one brotherhood.

A scarcity of goods from a scientific point of view cannot exist if there is fair warning—even in so delicate a matter as the supply of radium. The hand of God is less terrible than that of man, careless man. Starvation is the greatest danger. New York (about

one-tenth the population of the country), for instance, is so situated that it can be starved in less than a month by shutting off only a few staples. The dependence on a few glittering tracks of steel is, to say the least, scandalous. Emergency provisions for breakdowns in transportation are, from recent experience, none. Unorganized as our methods of assuring supplies are, there is this additional danger and inadequacy.

What seems more scientifically sane than that provision should be made for the greatest amount of material independence? Community, as well as personal thrift, requires an auditing of stock, and self-reliance on home products. With regards to necessities all states should maintain independence. Food, clothing, shelter and tools should be held in reserve for insurance purposes. To such a task would real scientific management first devote itself in the distribution and utilization of the material wealth of the world.

What then are the prospects of improvement? I think they have become rather definite during the last few decades. Industrial systematization is pro-

ceeding along more and more enlightened lines. No longer is the maximum work expected in certain quarters from men but from the rationale of their organization. The twenty-one men who run a giant acetic acid plant need not be kept jumping about for efficiency's sake. It is seen to be economically as well as ethically unworthy to demand maximum pressure from an item that amounts in some cases to as low as one-half per cent of the cost. Is there not the same truth to be found in the cases where labor is fifty per cent of the cost? What boots it all this driving of men, furthermore, where an inventor may, as in the case of a certain copper extraction process, change the rate of oxidation from 48 hours to 10 minutes? Economies are to be found first and foremost in the application of thought and not of the whip.

Let us welcome, therefore, a new era of industrial monographs, stimulating the inventive talent of the community. I understand that the oil industry boasts of an abstract library of 72,000 references to the world's literature. What progress there could be if this knowledge were available to the large mass of

workers, if it were only to save the waste of time in piecemeal duplication! A movement is well on foot, beginning apparently first in England, participated in by the more idealistic technicians, to lay all cards on the table for the common good. Such a movement deserves organization and financing. The Bureau of Standards would receive its inspiration from such an organization instead of struggling with relative futilities. The Bureau of Mines would find much needed companionship and the Smithsonian Institution could enter the practical field with dignity. If reason wins, it is inevitable that very soon there ought to be a great pooling of knowledge. Because the chaos of slapdash research is keeping more than twenty abstract journals guessing as to what next, because no single man can be all-knowing in even one industry, men shall have to come together. It is good that some have done so already.

Between industries and professions there is an incipient coöperation of the scientific order. There is a growing class of two-branch men, as biological chemists, medical-physicists, and the like. The gains are considerable—note, for instance, the appearance

of fermentation acetone, isobutyl alcohol, and citric acid; chemotherapy and its salvarsan, atoxyl, novocaine and procaine; new textiles proposed by chemist-botanists, and perhaps not less fortunately new projects proposed by poet-scientists. Thus the scientific minglings have their industrial fruits.

In the matter of machinery, by means of cataloguing, a coördination was thrust upon the industries. The trend is distinctly toward standard machinery and parts, yet there is no listing on a large scale of the interchangeability of such parts, except in the automobile industry where a hundred types may be compounded from a small number of specific elements. This ought to be the case throughout; to insure savings on scrapping, to permit interchanging and ready repair. An accounting system of machine types, plant by plant, should soon appear to realize the first step in successful standardization.

Procedures will also tend to become standard. There is scarcely a study now, but within five years there will be many on such topics as transferring solids, liquid, gases, containers, mixing, separating and the like. Water and sewage sanitation of thou-

sands of cities in this country owe their specificity and reliability to just this kind of standardization. The organization of such reports would be a public boon. Nor will science lose.

Since 1492—and there's hardly any use going farther back—there have been some 10,000 periodicals that contained and still contain material of a scientific nature. The reports of greatest importance and interest do not, however, extend farther back than one hundred years and may be almost entirely located in one hundred journals. A review of these journals from various scientific standpoints with the aid of existing collations would require not more than one million technician-days for the establishing of a complete program of scientific research. That would be one thousand technicians working one thousand days or ten thousand technicians working one hundred days. The achievement is tremendous. Thus, the German dye industry, including experimental work, does not represent more than an advantage of two hundred thousand chemist-days over the rest of the world.

With the available coördination of past knowl-

edge, development work can score tremendous savings. By means of the same apparatus constants can be determined for twenty projects at one fell swoop. Any worker in the field knows well the tragedy of a week's set-up for five minutes of experimental glory. Coöperation would eliminate simply millions of technician-days. The truth of this is so obvious that any one short of being a Calvinist-ultra-pessimist as to human nature, would be sure of the coming coöperation. This surely applies to industrial research. In pure science research an alternative form of more individualistic concentration may persist, because fortunately many a university carries its equipment on, and research is combined with training. In industry any further delay is simply unpardonable inertia.

Scientific councils for the consideration of specific problems have not as yet developed. Scientific society meetings contain, if at all, no more than unprepared discussion. Consultation could be a misnomer, drowsy gossip would be better. Why is the time for a synthetic product, like the Liberty Motor produced by a council, gone? Industrial science in its

present-day development demands, by its very nature a meeting of inventive minds; and in serving the community at all times, war or peace, emulation must replace competition. Propaganda for the enlightenment of the technician-scientist group as to their social functions is a pressing duty. There is no royal, nor individualistic road to technical knowledge.

I must supplement the discussion of technology and economics with some further reference to the development of the other two main currents: science in theory and science as philosophy. Their progress is essential to that of the other.

Pure science, somewhat scornful of worldly matters, may well offer its very glory in a more deeply practical way, in propagating its very method and its very inspiration. Confining ourselves to researches planned to produce knowledge leading merely to generalizations which need not be useful, we find that if they are any good they are conducted in a methodical and a combined analytical-synthetic manner. Pure science researches serves as models of procedure, and thereby achieve even a higher utility.

Of these approaches I would point out two. They are either to start with a superfluity of data and derive hypotheses, or to start with a specific hypothesis and look for verification in the facts. The first is rather unintelligent, the second possibly rashly *a priori*. If national divisions can be traced at all in science, the preponderance of the first method has been in the United States and of the second in Europe; but times change. Thus, everywhere, some research has succeeded in being impersonal to such an extent, that the question arises whether an unnatural elimination of the personal factor is properly a scientific procedure. TOLSTOI's certainty that science is a matter of counting the number of ladybugs on this planet, or CARPENTER's demonstration that science is the method of ignorance, or of wilful misobservation, are almost justified by an epidemic of uncritical researches. Besides, HENRI POINCARÉ has truly warned us that one of the most dangerous forms of hypothesis is the unconscious hypothesis. It is difficult to prove or disprove because it does not come to clear statement. Is there not a profound con-

tribution to the utility view of theory in such strictures?

The methods of science illustrate the same wisdom of research. Again there is a see-sawing between experiments and purely mental analysis. The rush toward experimentalism must not be too precipitous. A century old warning of LAVOISIER too is that "however certain the facts of any science, we can only communicate false or imperfect impressions to others if we want words by which these may be properly expressed." Indeed we shall very neatly deceive ourselves as well as our hearers. Pure science runs the risk of the pomposity of uncriticized teachers.

The criticism of science is none other than the function of the philosophic school. Science has been quite thoroughly hazed and a bit browbeaten. I have discussed it under the significance of science. We are certain at least, however, that the search for exact truth does not favor dogmatism. EINSTEIN'S theory of relativity is, aside from its brilliance, an example of the new spirit of self-flagellation that has

arisen in science itself. The old foe has reappeared as an assimilated, internal critic.

Science and social philosophy must also learn to meet. The most obvious common ground I feel is that of education. An insistent challenge to science is to be found in the invitation to extend its practical methods into the field of education. What shall we teach, and more, how shall we teach, are possible scientific problems. A self-conscious contribution of science in this field will take full cognizance of art, religion, and their allied disciplines, as equally basic. The time for broad, tolerant, and canny scientific theories of education has arrived.

It really does improve the spirit of science to take on new responsibilities. The motivation of research expands. Thus, what has science to say about democracy, coöperation, national life? If it claim ignorance because of detachment, by what right can it claim detachment from anything of life? At least to avoid slander, the scientist had better draw his own sociological conclusions for fear of the mutilation of his facts by journalistic snoopers. And then again there

is no such thing as a fleshless and bloodless investigator without companion interests.

Another social function of the scientist must be the forecast or the actual effort to rearrange the future. Says LIEBIG: "The secret of all who make discoveries is to look upon nothing as impossible." It is not mere rashness. It is possible and desirable to organize prediction, to estimate probabilities and to suggest distinctly what novelties to seek. It is good to estimate somehow the social advantage of a possible discovery. It is probably done vaguely. It should be done with all social ethical fervor. The stakes should be known. Shall we produce food chemically at an efficiency of 75% as against the vanishing 0.001% efficiency of a tree with its gigantic exuberance? Such synthetic ray houses would change the face of the world beyond recognition. It can be done. A historic example of just such a deliberation has actually passed on its way. I refer to LORD KELVIN'S warning about the future of the world's food supply which stimulated research on nitrogen fixation or "burning the air" to fertilizers. There is a dread also in this tampering with the future, because the ni-

trates which serve as fertilizers may also serve to make explosives. Yet the positive value is an ever-present lure. I should propose some such program of speculation, the conscious stimulation of socially important inventions, a *Journal of Hopes*.

This conscious attention to scientific service to mankind will develop to its proper status that group, which, according to WELLS, is distinguished by "a desire, a passion almost, to create and organize, to put in order, to get the maximum result from certain possibilities. They will all be artists in reality, with a passion for simplicity and directness and an impatience of confusion and inefficiency." How true will ring the words of the veteran PASTEUR addressed in honor of CARNOT:—"If I might be allowed to conclude by a philosophical remark, I should say that two contrary laws seem to be wrestling with each other at the present time; the one a law of blood and death, ever devising new means of destruction and forcing nations to be constantly ready for the battle-field—the other a law of peace, work, and health, ever developing new means of delivering man from the scourges which beset him. The one seeks violent

conquests, the other the relief of humanity. The latter places one human life above any victory; while the former would sacrifice hundreds and thousands of lives to the ambitions of one. The law of which we are the instruments seeks, even in the midst of carnage, to cure the sanguinary ills of the laws of war. . . . Which of these two laws will ultimately prevail God alone knows. But we may assert that French science will have tried, by obeying the law of humanity, to extend the frontiers of life."

RELIGION—WHY HAST THOU
FORSAKEN ME?

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RELIGION IS A relatively safe topic of discussion, provided one does not discuss the religions. The latter may only be fought about. This is so definite a phenomenon that the doubter and the peacemaker alike must avoid the particular and speak only of the general. Since, however, the general is derived in our experience from the particular, there will probably be as many varieties of general opinions as there are of particular dogmas. And clearly enough there are. There are literally scores of definitions of religion, and hundreds of interpretations of these definitions. The philosophy of religion is forced into the statistical method at the very outset.

TYLOR, the student of primitive religion, had offered a minimum definition of religion as the "belief in spiritual beings." Even this minimum is too large for some. They would erase the word "spiritual" to substitute something much weaker, namely

"quasi-material." At the same time belief involves practice of some sort, which in matters religious may be termed "worship." Frazer's definition condenses these ideas in characterizing religion as a propitiation or conciliation of powers superior to man which are believed to direct and control the course of nature and of human life. A typical attitude of an anthropologist, for example MARETT's, is to designate religion as the feeling, thought and action in regard to the sacred. This concentrates the attention on the meaning of things sacred, and makes possible a science of the sacred. It is very convenient to give religion an object as well as a subject actor. Such plausibility, however, is not sufficient for the man who has his attention turned to more civilized folk. To MAX MULLER religion, thus, consists in the perception of the infinite under such manifestations as are able to influence the moral character of man. Infinity and morality make their bow. In the ascending scale of the definitions there is finally FICHTE's which states categorically that religion consists in the fact that in his own person and not in that of another, and with his own spiritual eye

and not with that of another, man sees, has, and possesses God immediately.

FICHTE contradicts or is contradicted by sociologists, who are quite as certain that religion is but the consciousness of the highest social values. The individual is extinguished, and morality is reduced to a social reaction, entirely relative and not based on any inner sense. How different, too, from KANT's viewing all our duties as divine commands. Another group looks upon subtle religion as false religion. Even in the Journal of Theology one may find the opinion that religion is not the question about God, and not the inquiry into the origin and purpose of the world, but the question about man. This is not exactly COMTE's religion of humanity, in which humanity is God, a humanity past, present and to come conceived as the Great Being, but a reduction of all elements to more or less blind social forces. At the hands of certain psychologists the matter is shoved down into the thinnest veneer, where even the social factor is evanescent. RIBOT concludes, after a thorough dissection, that of the religious sentiment properly so called, nothing survives at last save a vague respect

for the unknowable which is a last relic of the fear, and a certain attraction toward the ideal, which is a relic of the love, that characterized the early periods of religious growth. FREUD, I believe, would leave even less. The infinitesimal joins the infinite amongst the conceptions of religion.

The same spectrum of opinion is evident as to the origins of religion. From PETRONIUS' dictum "Primus in orbis timor fecit deos" * and the doubts of pessimistic psychologists of recent days, we run a gamut to opinions which postulate a specific religious instinct, or a compound of instincts, as MCDOUGAL'S blend of wonder, negative self-feeling, fear, tenderness and curiosity. How different is this from the concept of those who see religion flowing as an "Inevitable Inference." From no reason to all reason, from all feeling to no feeling. Moreover, most original LEIBNITZ opens for us the mine of the subconscious, as the source of the religious efflorescence. No doubt, in his case, it was. The cautious, who would investigate the savage and the child for the origins of religion, find two difficulties:

* The first creator of Gods, in the world was fear.

the savage already has religion, the child acquires his under the excessive influence of his elders. The question of origin usually yields to a matter of studying the simpler forms, and, as for the rest, trusting in psychological analysis no matter where it may carry us. Yet it is quite possible to deny any "natural" origin altogether and thus clear away the problem by removing it from scientific and even rational ken. That too has been attempted. The fundamental religious impulse is postulated to be inexpressible and incommunicable. If one may speak of an origin of something of this sort, it can only be something in God, ineffable and only directly apprehended. "Origin" would be too ordinary a term, full of practical connotations foreign to this point of view. Instead of saying "fear made the Gods" or "admiration made the Gods" or "wonder made the Gods," this conception would permit of only "God made the Gods."

This exuberance of definitions of religion and of notions as to its origin makes great demands on scholarship. Some impatience may well be felt, and a conviction may well arise that much learning about

religion is the vanity of vanities, and that salvation, if any, is to be found in directly embracing religion non-intellectually, but otherwise in the realest of all senses. This, however, is an error. Religious *thought* has always gone hand in hand with religious feeling. Part of the religious attitude is the wrestling with its implications extending into the neighboring realms of life. It was a wholesome revolt that was initiated by SCHLEIERMACHER when he defended the thesis that religion in its essential nature is neither a form of knowledge, nor a form of activity, but a determination of feeling or of immediate self-consciousness. His defense and the work of many of his followers did bring out the fact that a philosophy is not a substitute for a religion. The non-rational element came in for its own, and the prime position of feeling in religion was as clearly demonstrated as in the subsequent psychological studies. But, in the end, it is just as idle to isolate and dissect away feeling from the rest of man in religion as in anything else. It may have primacy, but not exclusiveness. The concensus of opinion, I think, has drifted definitely to the idea that religion engages the whole mind and

the whole man. Part of the comprehension of religion and even of its acquisition, lies in a survey of its workings. Religious thought is to be included in religious experience. We may look upon the great variety of opinion, therefore, as a means of grasping the potentialities of this protean tendency of man. A minimum definition of religion should show it to be cognitive, emotional and conative,—in its own way, but surely all of these.

SCHLEIERMACHER's defense also served to bring out the fact that there is a special element in religion, something uniquely its own, and justifying its independence in spite of its omnipresence in all of life's activities. I perceive the same tendency in the psychological and the historical studies of religion,—an effort to isolate a unique feature. We have heard a great deal, thus, of "religious instinct." As an entity, apparently, all efforts to isolate it in its purity seem to have failed. It recedes with the speed of a racing shadow. What survives in the expression is a consciousness of something deeper than reason. But this need not be called "instinct," it may just as well be faith, the subconscious, the co-conscious, a feeling, a

will, a value-judgment, a social sense, an intuition, a mystic reason, a "noumen," a "Zeitgeist," an "elan vital," a mind-cure perhaps, a moral sense; and many other of the entities the philosopher and psychologist deal with. One may claim that too much is equivalent to none at all. Yet we know it is there. The knowledge of its being may, in fact, be used as its definition. The expression, no doubt, is unfortunate, but there is something which demands description.

Scientific psychologists, indeed, have attempted to describe, if not a religious instinct, at least a complex of instincts operative in religion. The MCDOUGAL group has produced an analysis which can be summarized thus:—

Reverence, which is the "religious emotion par excellence" is a compound,

- Reverence
  - Awe
    - Admiration
      - Wonder
      - Subjection (or negative self-feeling)
    - Fear
  - Gratitude
    - Tender emotion
    - Subjection

There are those, however, who also speak in the name of psychology, who would dismiss such an

analysis as entirely missing the point, since it contains no reference to the *unique* element which is felt to be present. R. OTTO has reduced it to a sense of the holy,—"a category of interpretation and valuation peculiar to the sphere of religion." It is inexpressible, incommunicable and irreducible. It may be described faintly only by analogy, although its existence may be promptly and distinctly recognized. In the description given by this author, mystery and fascination and creature-consciousness stand out. The last is the emotion of a creature, abased and overwhelmed by its own nothingness in contrast to that which is supreme above all creatures. There lurks in all these attempts a sense of the "numinous" or the objective something behind phenomena. This is best described, and is most worthy of recognition as unique, by JAMES. He observes: "It is as if there were in the human consciousness, *a sense of reality,* a feeling of *objective presence,* a *perception* of what we may call '*something there,*' more deep and more general than any of the special and particular 'senses' by which the current psychology supposes existent realities to be originally revealed." It is "as if," but

it is. JAMES does not pursue the matter, although he recognizes that there may be more than one road to reality. Who will trace this road?

Have the studies of the subconscious traced any of the road or proved it a blind alley? I would fain include them in my account of the psychological handling of the problem, but I must confess that I can scarcely interpret the terminology that is being used. The very term "subconscious" may have a purely psychological meaning, the so-called "unconscious cerebration," or it may mean the fringe or background of the mind, a kind of sub-attentive consciousness, or it may refer to split off states of personality, or it may point to the factors which make up our racial and even individual past. Now, which of these varieties of the subconscious is going to explain the varieties of religious experience?

Historical and anthropological studies aim at their own species of objectivity. These on the whole have substantiated the psychological approach, and to some extent even the suggestion bordering on the mystic. At any rate they are not in crass opposition.

A typical study employs the definition of religion

which points to an object. That object is designated as the "sacred." Various primitive cultures are examined, and conclusions drawn about the sacred. MARETT singles out six aspects of the nature of the sacred. It is the forbidden, the taboo, and it may take on either the aspect of uncleanliness and sin or of the ascetic virtues of purity, devotion and dignity, depending on a twist in interpretation. It is the mysterious—in the sense of the strange, the new, the portentous. It is the secret, as is so fully attested by the predominance of ceremonial and almost continuous initiation in the life of the savage. These negative aspects are supplemented by positive ones. The sacred is also the potent, having "mana" or psychic energy of a sort, and is really what confers virtue on spells and incantations. It is distinctly and decidedly the animate. It also connects itself readily with the ancient or some "dream time" in the past. In some primitive languages a word may stand for practically all the six and more. The word "wakan" is alleged to mean mystery, power, sacred, ancient, grandeur, animate and immortal.

The activity of the sacred is characterized, accord-

ing to these students, by great fecundity, tempered by an alarming ambiguity. The blessings of the Gods are a two-edged sword. They may see fit to do harm. Relativity also appears very early. It lies in the fact that one taboo may be more inviolable than another, so that the sacred separates into grades. Another trait of the taboo is its transmissibility. The sacred must be watched, and contact with it confers special distinction.

A veritable system of means of exploitation of the sacred is listed. Thus, it has been found that ideas exist to the effect that the sacred may be acquired, rather than that it is innate. Great concentration, as the piling of ceremony upon ceremony, promotes it. The sacred may be induced by sacrifice. It can be renovated, it may enter one's life, it may be insulated to ward off trespassers, and it may be directed by its owner. MARETT sees an echo of the last even in the humble worshipper's words, "Thy will be done," a desire to help the action out.

The results of the exploitation of the sacred are of the utmost importance to the primitive. There is a definite consecration of life, and a development of

the will to live and to do. It makes them glad and it makes them good. They gain "second sight," achieve success in war due to a general strengthening, and find themselves in their social milieu. The crowd is the thinking unit for the savage who has accepted religion. Indeed, he absorbs his religion as almost an undifferentiated part of his social environment. It is thoroughly kneaded in with his entire education, his priest-king government, his food-getting and his food-taking (which is always more or less of a sacrament), his ideals of kinship, his ceremonial relations with the family and the outstanding family features of birth rites, marriage, name giving, and, alas, funerals. It colors his views on sex and on personality. If he is a certain kind of a canny priest, it has been observed, he may abuse the sacred for the private purpose of envy and malice and gain.

This is a model for similar studies of the evolution of religions and religious institutions. I do not propose, however, to review here the development of the early animism, described above, into polytheism, and the transformation of the latter into monotheism, but propose to turn directly to some summaries of the

religious sentiment in a well-developed form. It may serve as a contrast and as a parallel, and possibly as an index of the trend into the future. The primitive forms receive "sublimations" into higher ones. There are survivals, too. One always thinks of them in reading about savages. Above all there have been and will be more and more delicate differentiations.

The great diversity of modern forms of religion has led historically-minded psychologists and analytically-minded historians to comb out leading ideas from the tangle, even where the fundamentals may be vague and uncertain. My impression is that questionnaire methods as to religion are confused and confusing and easily confusible. From what people say about their religion the conclusion is that they might say almost anything. James approached the matter, however, by choosing the utterances of extremely religious characters and mystics, on the supposition that the somewhat pathological may reveal more about the normal than a direct examination of the average by the most elaborate statistical means. His extract of common religious beliefs reveals on analysis the following convictions:—

(1) That the visible world is part of a more spiritual universe from which it draws its chief significance.

(2) That union or harmonious relation with that higher universe is our true end.

(3) That prayer or inner communion with the spirit thereof—be that spirit "God" or "law"—is a process wherein work is really done, and spiritual energy flows in and produces effects, psychological or material, within the phenomenal world.

To those he adds two of a psychological order. They are:

(4) A new zest which adds itself like a gift to life, and takes the form either of lyrical enchantment or of appeal to earnestness and heroism.

(5) An assurance of safety and a temper of peace, and in relation to others, a preponderance of loving affections.

In isolating what is common to all creeds he discovers

(1) An uneasiness—a something wrong about us as we naturally stand, and

(2) A solution of the problem—a sense that we

are *saved* from the wrongness by making proper connections with the higher powers.

The worshipper, according to JAMES, becomes conscious that his higher part is coterminous and continuous with a *more* of the same quality, which is operative in the universe outside of him, and with which he can keep in working touch; and in a fashion get on board and save himself, when all his lower being has gone to pieces in the wreck.

This is a very serious consideration. It expresses the spirit of dependence of the religious man on his God. I conceive the most religious moment in Christ's existence to have been when he exclaimed "Why hast Thou forsaken me?"

Other analysts of religious belief classify them in varieties of similar sorts. To HÜGEL they are three types (1) the traditional, (2) the rational, and (3) the volitional or mystical. Pratt describes three, (1) primitive credulity (2) intellectual belief and (3) emotional belief; or recasts them in four:—(1) *traditional belief* deriving authority from the past, as represented by parents, teachers, customs and the like, (2) *rational belief* bolstered by reason and veri-

fiable experience, (3) *mystical belief* applicable solely to particular kinds of experiences, purely subjective and not verifiable and (4) *practical or moral belief,* rather attenuated as a belief since it places emphasis on doing rather than feeling. The church is the ally of the traditional. It has social value. ST. AUGUSTINE, SPINOZA and the Unitarians will serve to illustrate the rational. The mystics are the real independents. They are the individualists of religion, self-sufficient in their inner life. Their intoxication, however, may become a means of self-gratification rather than the pure recognition of the "numinous." The practical is illustrated by KANT's viewing all our duties as divine commands—the categorical imperative. GAUTAMA, too, was a religious pragmatist in the command: Work out your own salvation with diligence. The reason for all these varieties is—the whole man responds to religion in all his ways.

Attempts to trace the religious beliefs of the adult from those of the child and of the adolescent may cast some light on the priority of the different forms. The most wistful truth to me is the observation that the beginning of doubt is the farewell to childhood.

Yet it seems to me I have seen very skeptical children. Was it the influence or the direct teachings of their elders or natural development? There is nothing available that is very convincing on this subject. Will the reader agree to place a spontaneous religious deepening at the age of 15, and a storm and stress period at 18, accompanied with a sense of sin, in agreement with STARBUCK? Those are but shreds of observations that some one may build into a system. Our personal development in the religious sphere proves to be very difficult of analysis, since it is so intricately involved with the prosaic advance of life.

The dramatic turning points of religion, of course, have attracted more attention and have yielded more results to scrutiny. The highspots discussed by JAMES include what he calls the religion of healthy-mindedness, the sick soul, the divided self, the soul-stirring phenomenon of conversion, saintliness, mysticism, the effect of the aesthetic life on religion and prayer. Others would stress the belief in God and in immortality. Still others, like LEUBA, would inject a pragmatic description of faith in opposition to the over-

dramatization of the religious experience. Note this from him: "God is not known, he is not understood; he is used—sometimes as a meat purveyor, sometimes a moral support, sometimes as friend, sometimes as an object of love." Topics for a personality like HOCKING, on the contrary, would be God-Making, Union with God, How Men Know God, Religion as a Parent. Each sees different elements in the more striking light. I should imagine a composite of the impressions of such men would in itself reveal the extreme variability of the religious principle. My own interest is greatest on the question of a belief in God and in immortality and the nature of conversion. My wonder is arrested most by the phenomenon of private prayer and the ecstasy of the mystic. These serve to illuminate the religious element to me more than anything else, and in them I should be tempted to indicate a possible value not to be found in the outer trappings of religion.

The belief in a God, is it essential to religion? It is customary to point to forms of Buddhism as illustrations of cases of atheistic religion. This amounts to judging a religion from its philosophical expres-

sion. I should rather say that, if the contention has any truth in it at all, it is that it is possible to express religious emotions and rationalizations in a manner which avoids naming the focus of adoration or worship. That, it seems to me, is in itself a form of worship of the sacred. God is the underlying unity, held in such respect as to be thoroughly shielded from the limitations of categories. Pantheism has its God too. Its personality is merely more immanent and ineffable than the usual theistic forms we are familiar with. It is an intensification of the idea of presence, clearly seen by the Stoics and the Christian teachers, CLEMENT, ORIGEN and ATHANASIUS. It is the opposite, in a sense, of the cruder conceptions of an external Deity, which drew the irony of CARLYLE, an absentee God—sitting idle ever since the first Sabbath, at the outside of his universe and "seeing it go." But the cruder conceptions are still conceptions of God. It is a mistake, therefore, to assert that primitive religions are also Godless. The great FATHER UNKULUNKULU of the Zulus may not appeal to us any more than a foreign God did to CARLYLE, but it would be a sheer distortion to impose upon

them a psychology of religion different from ours. They have a different theology, commensurate perhaps with their scientific or economic development, but derivable from the same psychological need and recognition of the *more*. This applies to the entire gamut of conceptions of God. If there were a worshipper who found his prayer to take the form, ironically proposed by FREDERIC HARRISON, "Oh, X," love us, help us, make us one with Thee," even he would have a God.

Even if there were perfect agreement that all worship implies a God, there would still be the bewildering confusion of God-ideas. They are as curious as the entire story and range of civilization. The reason for their multiplicity is that an attempt is made to conceptualize an intuitional fact, a direct datum. The deacon who described God "as a kind of an oblong blur" was doing his best to translate the untranslatable. It is the least anthropomorphic of the definitions I have come across. From ODIN, through WODAN and GODIN to GOD, the usual descriptions are either personal or quasi-personal. The Divine Architect, the Great Father, the Ultimate Force

(the Forceful One), the Final Cause (The Causer of All), The Power that makes for Righteousness (the Ethical One) are outstanding versions. Every shading of the imagination and of conceptual thinking has been applied in describing the elusive goal of adoration. Since men are but weak system-makers, avowed religions are not subtle. The lived religion, however, is as subtle as life itself, and its truths lie not in explanation, but rather in the retirement of reason and in the growth of feeling. God is being constantly made.

The belief in immortality attaches itself most naturally to this confidence in a God-existence. I imagine it to be a direct perception also. It is a more obstinate one, and indeed resists uprooting more than the idea of a God. It requires years to convince a child that its death is even a probability. The adolescent and most adults well illustrate the proposition that all men think all men mortal but themselves. This belief has an inestimable survival value and tends to defend itself against practical logic by reacting on the belief in God. Immortality I should credit in the first place as the evidence of God, rather than

God as the evidence of immortality. Thereafter they become mutually reinforcing perceptions. The child's certainty and the adult's yearning for immortality I imagine are the main psychological props, although not philosophical proofs, of the existence of God. I say "existence of God" because to believe in a God is to consider his existence as proven. There are, of course, as many immortalities as there are Gods. I am particularly charmed by FECHNER's vision of immortality. It is simply put: "Man lives upon the earth, not once, but three times. His first stage of life is a continuous sleep; the second is an alternation between sleeping and waking; the third is an eternal waking." It is an immortality worth living for.

The phenomenon of spiritual rebirth, or conversion is one of the most interesting of those that occur in the religious life. The force which can produce a "twice-born" person is almost as potent as FECHNER's prescription for a three-stage life. It has produced extreme emotional cases, like that of BUNYAN, which we may not admire on account of their neuroticism, but it has also given us awakenings like those of TOLSTOY, CARLYLE, TAGORE. The latter are of

a moral type, and still belong to the category of the religious, though to more prosaic types they seem to be anathema because of their independence. We do not press the point as they did in the days of MACAULAY. Says he: "The young candidate for academic honors was strongly interrogated as to the day and hour when he experienced the new birth." We do like to hear, however, the confession of young students that they have felt a rebirth, that they have become moral selves. Such conversions are the basis of maturity. They may not deal with the usual religious objects, but their earnestness is of very close kin to the religious perceptions of God and of immortality.

The phenomenon of prayer follows in the wake of conversion when it relates directly to God. The term communion would include, I believe, all kinds of unspoken prayers and wishes, the psychoanalysts' "libido" itself. Whatever one prays for in full voice or with a still voice, from mere physical bagatelles to mystical union with the All, it is the outpouring of the same hope and the same faith that men live by. It also runs the entire gamut from silliness to

the most sublime imaginings. Different gods, different conversions, different prayers.

The "consciousness of a Beyond" carries us by stages into mysticism. There is the cosmic consciousness of the poet, the intuition of lovers, the religious mysticism which turns to the Divine as its object. What is called mysticism here is identifiable with what has been termed "knowledge by acquaintance" rather than knowledge by conceptional reasoning. It is immediate and no more describable than a sensation of color, of sound, of warmth. It must be felt to be really known. Our sensations are mystic. If the Divine is sensed in the same way we have the mystical and at the same time the realistic foundations of religion. The two worlds of perception, the physical and that of the Beyond, are on a par in perception. The extreme development of the faculty to perceive the Beyond-world constitutes the strength of the religious mystic. The details, again, hardly matter. A simple summary will suffice. JAMES has furnished material for it. The characteristics of the mystic states are:—

(1) Ineffability—they defy expression, they are direct experience more like feeling than intellect.

(2) Noetic quality—they are states of insight into depths of truth beyond discursive intellect. They include illumination, revelation and are full of significance and importance, although inarticulate.

(3) Transiency—they last from ½ to 2 hours and are difficult to revive; they develop on recurrence.

(4) Passivity—the will has to be held in abeyance, it is in the grip of the supernatural.

Surely it is a rare treat to experience this in its fulness. There is even a kind of technology of mysticism which draws fine distinction between "ravishment," "levitation," "ligature" (loss of will) and "ecstasy." What a curious field! But they need not concern us beyond a nodding acquaintance here. I cite them in the conviction that there are more things in heaven and on earth than are dreamt of in many a philosophy, and that these things religious mysticism may help to throw into relief.

I submit that when I survey the psychological nature of religion, its omnipresence, and its claim to

direct knowledge, something of a sense of forlornness arises in me. "Why hast Thou forsaken me?" wells up as a prayer to that which has cleared the tortuous pathway for mankind thus far. Why, oh, why, may we not develop beyond mere incipiency this sense of the cosmic, which has intoxicated with a strange happiness but a few fortunates touched with genius, this sense of senses, receptor of unheard of and fateful cosmic energies? It is a golden hope set in wistfulness.

THE VEILS OF POSSIBILITY

THE VEILS OF POSSIBILITY

To be and not to be that is the answer.

IT WOULD BE fitting to close the year of doubts and faiths with some doubt of doubts or faith of faiths. If it were but possible!

Several worlds have claimed our attention,—the unescapable whirlpool of the external world, the unutterably endless inner world; the world of the scattered Man-God; the melodramatic worlds of intellect, emotion, will; the worlds of subjective art, objective science; the practice of this world and the practice for the other. And are there other worlds?

There is no end of worlds,—the possible worlds, the thinkable worlds, the worlds in the making. I should call them the worlds of philosophy, fringed by worlds of madness and by worlds of mysticism.

I shall not quarrel with philosophers who will not accord to philosophy this function of lifting the veils of possibility. They may have their say and I will have mine. There can perhaps be a philosophy con-

cerning philosophies. Its wisdom would be in postponing the decision as to the "only way" in philosophy till the end of time. Philosophy used to denote simply, "the pursuit of wisdom," and through many changes, I believe, has come to mean "the scientific treatment of the general questions relating to the universe and human life." It discourses of mind and matter, cause, force, freedom, necessity, the good, the true, the beautiful, the real, the universe, the individual, God. The widest of fields, in a way, but in a narrowing manner. If this claim for philosophy is true, I protest in the name, then, of a critique of philosophy so conceived. For me philosophy should include poetry, and should touch upon insanity and the ineffable. I do not fear.

No amount of scientific jargon can decide what is a possibility and what is an impossibility to the non-Ptolemaic philosopher, before all approaches have been tried. Indeed, as a scientist, I plead for the application of the *scientific* method to philosophies. Experiment with them. It is a scientific hope, amounting to conviction, that leads me to expect discoveries even surpassing the recent triumphs of

experimental science, from *experimental* philosophy. At least the philosopher's soul permits itself to aspire to be the spectator of all time and all existence in all ways. Perhaps this is what KANT meant when he remarked: "There is no philosophy. There is only philosophizing."

The philosophizing, it is true, has had centuries of an alchemical past. It is not yet chemistry, but it is on its way. I am stimulated into a living hope by discoveries of philosophic *enfantes terribles*—"beyond good and evil," "pure reason is a myth," "fact-in-itself," "neutral stuff,—the old logic is "solemn humbug"—"language habit" for thinking—"emergency" —"I do *not* exist because I think"—"Insight transcends thought," "This is the largest elephant in the world himself excepted"—"To say that all statements are lies is a lie"—"The curse of intellect"—"The psychical part of alcohol"—"the meaning of meaning"—"unmultipliable and infinite unity." When I hear this Babel of tongues I feel with JAMES that in some way we must be fallen angels. At the same time I see in it a hope of grace. To the embattled philosophers I would address the words of SRI KRISHNA:

"Rather fulfil thy own Dharma, no matter how low it may be, than the most illustrious Dharma of some one else." Or, grind thine own axe and grind it sharp.

What of the numerous wrecks on the rocks of vocabulary? We have as a result all the more accurate study of language and symbolism. I do not know whether any one has followed JOHN WILKINS' attempt at a philosophical language (1668), in which he proposed signs instead of words for things and relations, but since he had to explain the signs by means of words, the undertaking apparently did not succeed. I tremble for the success of the confident onslaughts of OGDEN and RICHARDS who believe they have at last put meaning into "meaning" when I think of forgotten WILKINS. It is a dreadful thing—with no easy escape—to struggle Laocoön-wise with language. Nor would I, however, offer with Lady Welby a £1000 prize to any philosopher submitting documentary evidence to show that he

(1) Knows what he means
(2) Knows what any one else means

(3) Knows what every one means
(4) Knows what anything means
(5) Knows what everything else means
(6) Means what he says
(7) Means what he means
(8) Means what every one else means
(9) Means what every one else says that he means
(10) Can express what he means
(11) Knows what it signifies what he means
(12) Knows what it matters what he signifies

There is always a dread danger of being involved in some higher foolishness, of "thinking wishly," or of one side inventing the other. Justice must make us pause and concede that it is the philosophers themselves who have pointed out these pitfalls. VOLTAIRE, writing to FREDERICK WILLIAM, says: "There are some charlatans who admit no doubts. . . . Doubt is not a pleasant condition, but certainty is an absurd one. . . . From the depth of our profound ignorance let us do our best." This is still about the best. So is his: "In philosophy you must doubt things which you understand too easily, as much as things which

you do not understand at all." And if we are to search for the true characteristic of a philosopher what can be better than MENO's salutation: "I heard of you, SOCRATES, before I met you, that you are always doubting yourself, and causing others to doubt"?

It is the doubts of philosophers that bring their faiths and lift the veils of possibility. Even the Universe has been questioned. We can now speak of *multiverse* or *pluriverse* even if the trend is away from the older "unseen" universe. LEIBNITZ's monadology is always cropping up in some way or other; in other words the ultimate nature is repeatedly presented as psychical and plural, the monads. The opposite pole of this idealistic tendency pops up just as often. It is "solipsism" or the philosophy that only the philosopher speaking exists and that everything else is simply his idea. It is a doctrine full of difficulties for the practical sense, but it *cannot be disproved*. Everything may be dream-like in the manner claimed. And that is where the matter ends, the appearance is again treated as a reality. One thing philosophy teaches us to expect is that to reject one

belief for some reason requires another belief for what appeals to one as a better reason. The doubts, then, are struggles between rival forms of reason. In the struggles our intellectual store is extensively enriched, our minds are opened and in the vast potentialities contemplated, we walk with greatness.

Such optimism will not be dismissed without its doubt. We must stop a moment for the plaints of the unsatisfied, and for those who would shift their very selves away from life altogether. My heart goes out to them with the exception of one group. The "peevish" I call them. I read in one of them under the title *Universe,* "This book solves all problems of why, how, what in science, religion and philosophy. . . . Removes the fundamental error from mathematics . . . proves EUCLID's "Axiom" about parallels. . . . Shows how gravity works . . . shows how to get energy out of atoms . . . Proves that the Constitution is right." This book has a preface by a very noted philosopher. What tolerance! Another answers all with "cubic" philosophy. *La Secret de l'Univers* by yet another discovers the root of things in feminism! Bent on showing mind is matter, one, to remain un-

named, gives authoritative details on God as chemical law, the sexual energy of atoms, the electric soul and magnetic life. When their tone of hurt at non-recognition in Messianic splendor is not too offensive, I am grateful even to them, for they tug at least at the veils of possibility. And besides they point to the absurdity of untampered certainty.

In contrast to these are the truly individualistic rebels, those who would escape all prisons, the bonds of body, mind or anything else. It is not "sheer cussedness" that prompts them. I refer to the philosophers of egoism of the type of STIRNER—"selfness." Man is the unique one and is to himself the supreme being. It follows that he is free to contradict anything if he wants to. At least so it seems to these partisans of freedom. They are fond of referring to the declaration of independence of GOETHE, which, however, may mean something else, "Ich hab' Mein' Sach auf Nichts gestellt." * It is somewhat surprising, but true, that this philosophic egoism leads to tolerance rather than peevishness. The Isha Upanishat has it: "He

* I have built my cause on no one thing.

who seeth all things in the Self, and the Self in all things, he hateth no more."

Alas, for one of these aspiring souls there are ten who came, who saw a little, and were conquered in defeat. They are not nihilists. They are those skeptics who have reduced constructive thought to zero. Their chief article of faith, exempt from questioning and doubt, is that they have outgrown "all" possible points of view, all of which are now and forever bound to be chimeras. This type of annihilator is fond of conjuring the principle of relativity as if it were a zero-multiplier for all substance and idea. The lie to the entire attitude is to be discovered, of course, in their very epicurean attitude toward life. Carpe diem. Sometimes it seeks Narcissus satisfaction in the bizarre in art. Quite as often it is sleepy and narcotic-laden, with waking moments at the market place.

The lot of those who have gone mad over the cosmic mystery seems to be a much happier one. They have at least adopted some world of their yearning, although they have hidden from despair. Perhaps they have been stricken with an intolerable

vision. There is a Hebrew legend that very few scholars had been able to remain sane after a direct vision of the truth of the Godhead. Poor mad lunatics they must be, but theirs is a distinction like that of Lazarus who had risen from the Dead.

Madness implies relief in some rôle. Why not develop one's own rôle? What are our own potentialities? It is here that the lifting of the veils of possibility can transform life and illuminate it unto transcendence. I glory in every effort to reach the Beyond-Man.

Every theoretical world may become a real world. Many such worlds already exist without yet being real in the sense of the concrete world. Yet, who can tell what is in the making? I wonder what the seekers of "the becoming in the become" find? A new becoming, I suppose. I welcome all shifting of coördinates. Perhaps there is an Absolute Invariant lurking in this infinite fertility. There would be a Mysticism worthy of the name!

I would fain see more of the illogical, the alogical and the superlogical. They are not the worst enemies of logic. They are its completion. JAMES is aware that

"knowing" may be only one way of getting into fruitful relations with reality. I presume he means knowing on the plane of practical logic, satisfactory in engineering and the classroom. Thus, when thought itself becomes an object of thought, there is something more than formal reasoning. OUSPENSKY is not insane, nor has he relapsed to the savage state, when he spurns the mainstay of traditional logic, the law of contradiction. He contradicts it in the name of a synthetic view in the paradoxic-sounding, but not empty, theorems:

> A is both A and not -A
> Everything is both A and not -A
> Everything is All.

He is talking of infinity. To some it is the fact of facts.

Such men have found a prison in the categories. Away from the old logic means away from the blinding of the truth by language, classifications, partial views. It cannot be convincing to those who have not realized the existence of a prison. The rebels themselves have never quite stricken off their chains.

I may not subscribe to the results, but I have faith in the urge. If there be the categorical division into physical and mental, someone should discover that which is neither physical nor mental. BROAD would say that numbers and propositions are neither physical nor mental. What are they? Bend your wits to the problem. BERGSON essays an escape of this sort in defining reality. It is, to him, "an endosmose or conflux of the same with the different." Irate logicians grow purple over such mixing of the same and the different, but I rather think BERGSON is nearer the truth.

I rather feel the same way about the alleged antithesis of the *part* and the *whole*. They are mere devices of a certain species of the understanding and they are created for specific purposes. Empiricism is the explanation of wholes by parts; rationalism the explanation of parts by wholes. Mankind of smaller dimensions or pretensions, I suppose, explains parts by parts. But may not some soaring spirit aspire to explain wholes by wholes? Or better still, eliminate the haunting distinction? The mathematicians have discovered a loophole. Among infinite numbers the

whole may equal the part, and the part may equal the whole. Suppose we are made of such stuff as infinite numbers are made of! What a discovery that would be!

In short, I see vistas of possibility, and I await the great age of the lifting of the veils of these possibilities. I await an ever expanding exploration of the universes of rationality, the discovery of new dimensions of rationality, the birth, through the fortunes of evolution, of a more than human mind, and its unlimited integration through qualities of time and space yet unsensed. Life is the Song of Hope.

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